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NOTICES:—All communications relating to editorial matter should be addressed to the Editor, who will be pleased to consider articles or contributions dealing with modern chemical developments or suggestions bearing upon the advancement of the chemical industry in this country. Communications relating to advertisements or general matters should be addressed to the Manager.

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Chemistry that has to Pay its Way

SEVERAL circumstances have combined recently to impress upon the chemist the importance of the works or practical side of his duties as compared with the laboratory or theoretical point of view. We cannot recall having seen the point put with more ruthless frankness than in the address which Dr. Charles S. Roy delivered the other evening to the students of the Northern Polytechnic Chemical Association. After leaving college, he told them, the main object of their existence as works chemists would be to earn money. They would have to remember throughout all their work that money was the dominating factor. It ought not, of course, to be so. The idealist has been telling us for quite a long time that production should be for use and not for profit; and perhaps, in some far-off age, men may be working for mankind instead of for masters, though whether they will enjoy it more it is difficult to say. But under present conditions works have unfortunately to be run for profit, or at the very least with freedom from loss, and the young or even the old chemist who can reduce the loss where loss is being incurred or increase or even maintain the profit where profit is being made is justifying his existence in the one way that matters to the board of directors. It is sad that such material aspects should count for so much, but since they do the sooner the better the works chemist recognises the unwelcome fact.

On the basis of this great truth, that the chemist has to pay his own way in the service he renders, Dr. Roy offers a series of very clear and sensible hints to the beginner. Many of these resolve themselves into plain common sense in the handling of problems and in relations with workmen. No better example of what this means can be found than the case of an expert who devises an elaborate pumping plant to convey fluids from one tank to another when the whole operation could be effected by gravity alone. Modern competition, one imagines, leaves little room for such experts nowadays, and a kindly warning of the fate that awaits such may not be wasted on the modern student. For the rest, the works chemist has to rely on keeping his eyes open, his senses awake, and his hands in practice—his whole being, in fact, in intimate sympathy and constant touch with the plant for which he is responsible.

There is one point in Dr. Roy's advice which cannot be too strongly emphasised, and that is the value of practical experience in dealing with a staff of workmen. "No amount of bounce," as he puts it plainly, "will deceive a skilled worker." If the man over him does not know his job, and gives advice or orders that merely reveal his inexperience, the workman's respect for him disappears, and his authority with it. On the other hand, the works manager who can show every workman under him how each should do his work and if necessary do it himself gains immensely in authority and generally gets on well with his men because he can estimate fairly the quality and quantity of their work. More than once has attention been called to the fact that for posts involving the management of plant and of staffs the works engineer is usually preferred to the works chemist. The former has gone through the shops side by side with the men, learned to speak their rich vernacular, and himself done the very jobs he will now require them to do. The chemist has too often made the mistake of keeping aloof from the men, of even looking down a little upon them. The result is that he misses one essential qualification for control, and is passed over when such appointments are being made. It is a good sign that these matters are now being discussed so frankly from all sides. If we accept all the criticism that is offered there is fault with our system of education and training, with the conditions that prevail in the works, and even with chemists themselves. When it has been made quite clear what is wrong—and that is the end of the present discussion—we shall begin to put things right.

At the London Section of the Society of Chemical Industry on Monday, Mr. F. H. Carr dealt with the need of a new order of works chemist, and suggested the grant of some degree representing on the technological or works side what the B.Sc. is supposed to represent on the academical side. The complaint was repeated that the "schools" are turning out chemists

of an impracticable type, but it was retorted that too often criticism is unaccompanied by any practical remedies.

A Methanol Mystery

OFFICIAL statistics, which have lately been published in America in connection with the wood distillation industry during the past year, do not, as might have been expected, go very far towards clearing up the contradictory statements as to the effect of Germany's exported synthetic methanol upon the American industry. In many respects, in fact, the situation is rather mysterious, for the figures demonstrate that while the reports which gained currency as to heavy imports of the German product during the first few months of the year were substantially correct, there seems to have been some inexplicable falling off in recent months. That there was, however, some cause for alarm on the part of those controlling the domestic alcohol industry may be seen from the fact that whereas in 1924 the total imports of methanol in America amounted to only some fifty gallons, in 1925 the quantity increased to no less than half-a-million gallons valued at about £40,000. On the other hand, the amount actually produced in America during 1925 was approximately the same as that made in 1924, and as exports in the past year were only half of those of the previous year, it would seem that evidently the use of methanol is extending fairly considerably. The largest outlets were, as would be expected, found in the manufacture of formaldehyde and for denaturing purposes, these accounting for nearly 60 per cent. of the total quantity used, while quite an appreciable quantity of the remainder was used in the production of dyes, intermediates and solvents.

A point of considerable interest and importance is the price at which the German synthetic product can be produced, for it will be remembered that rumour credited the actual manufacturing cost at works as being so low as 9d. per gallon. This figure has frequently been questioned by those in a position to know, but that it cannot be very wide of the mark is disclosed by the American statistics which, if averaged out, show that the value c.i.f. American ports was about 1s. 7d. per gallon, which compares with the present figure of about 2s. 3d. for the domestic product. It is, then, all the more mysterious that, as the past year advanced, the threatened German invasion failed to materialise, and many reasons have been put forward to account for this rather unexpected state of affairs. The suggestion is now made that the early reports as to the low cost of production of the synthetic product were too optimistic, and that the Badische undertaking is now meeting with technical and economic difficulties which were not appreciated in the first stages of development. It is even reported that the Badische plant is now closed down. On the other hand, the most likely explanation is that those at Ludwigshafen have tested the potentialities of the American market, they have satisfied themselves of the opportunities which exist, and they are now prepared to mark time until they are in a position to launch the offensive on a grand scale when they find themselves unencumbered with agreements which are known to have been made with certain distributors in America.

The By-Products Problem

THE accounts of the Gas Light and Coke Co. for the past year illustrate a tendency that may be considered more or less general throughout the gas industry. That is, while the use of gas itself continues to grow, especially for heating, cooking, and power purposes, the returns from the residual products of coal gasification are on the decline. In the case of this company, the largest concern of its kind in the world, the revenue from the sale of gas has advanced from £6,279,608 to £6,840,875, while the revenue from by-products has declined from £2,446,388 to £1,749,173. Taking the four principal items, the revenue from coke has dropped from £1,774,326 to £1,260,340; breeze from £141,926 to £111,802; tar and tar products from £390,674 to £275,094; ammoniacal liquor and sulphate of ammonia from £139,462 to £101,935. As regards production, the figures are: Coal tar, 20,391,335 gallons (1924, 20,508,578); ammoniacal liquor, 613,213 butts (1924, 597,619 butts). The quantity of coal used shows a drop of 91,167 tons, while the quantity of oil and spirit used in the manufacture of gas has risen by 5,342,943 gallons.

In no case is there any mystery about the decline; it is the result of competition and various other well-known conditions. The production of synthetic ammonia, for example, has greatly increased the total output of sulphate of ammonia, leading to keener competition for trade and a lowering of prices. Tar and tar products are in contact with similar competition from bitumen and from new materials coming into use for road construction. Coke, owing to the rates of foreign exchange, is not being exported to the extent it used to be, and the depressed condition of the metallurgical industries at home has further reduced its use. While, of course, these declines are naturally to be regretted, it must be remembered that the subsidiary lines they represent are far less important than the primary product, which is gas itself. Concurrently with the increasing growth of electricity, the use of gas for certain basic purposes continues to expand. It is this fact that gas cannot economically be displaced by rival products for so many essential purposes that accounts for the unshaken confidence in the future of the industry.

Problems of Ammonia Recovery

ALTHOUGH producers of by-product ammonia are probably justified in their fears that the enormously increased world output must eventually be responsible for an all-round and more or less permanent reduction in the value of combined nitrogen, they should at least be grateful for the fact that the menace of competition has begun to stimulate discussion of the deficiencies of the present methods of recovering ammonia from coal. The by-product manufacturer is, in fact, fast approaching a stage when he must study every shilling of the total expenditure incurred in the production of each ton of sulphate of ammonia, and the time has certainly arrived for a thorough examination of alternative processes—some of which have been known for years—in order to determine once and for all whether they definitely present the advantages claimed for them. During the past few weeks some protagonists of the various methods available have been engaged

in a most interesting discussion of the subject, and weight is lent to their arguments by the fact that they have obviously a close association with the practical aspects of sulphate of ammonia production. Argument has in the main centred round the old problem of the relative merits of indirect or semi-direct methods of ammonia fixation by means of sulphuric acid.

In these columns attention has frequently been drawn to the existence of the more modern semi-direct system, which has seemingly been ignored by establishments already equipped with the older form of separate distillation plant. Whether this indifference is bred of conservation or is the result of one or two unfavourable experiences with the semi-direct process it is difficult to say. At least, however, the time has arrived for some independent examination of the system in view of the fact that any drawbacks it may present should be capable of yielding readily to treatment by the modern chemical engineer. The conclusion at which one of the writers referred to arrives is that the semi-direct method lends itself to economies in plant, labour, fuel and water, which are not always capable of being effected in the usual type of indirect plant, but the extent to which these economies may be introduced can only be decided by local conditions. Meanwhile, attention is being focussed on suggestions for obviating the use of sulphuric acid. One of these involves the intermediate production of ammonium sulphite, a substance which, apart from its use as an intermediate, can be oxidised to the sulphate. Assuming that the process introduced no practical complications, it should provide an opportunity for saving about half of the present expenditure on acid. It is to be feared, however, from previous experience of the large-scale oxidation of sulphite to sulphate that the stumbling-block would lie in this part of the process.

Too Many Chemists in Germany

THE unemployed British chemist, who bemoans his lot, will hear with interest on the authority of advices to the American Chemical Society that one thousand German chemists are also out of jobs. We do not suggest he will rejoice to hear of his colleagues' misfortunes, though, as a humorist once remarked when asked if he derived pleasure from other people's bad luck, "No, but somehow it makes one feel better." The cause of German unemployment is the depression in the German chemical industry, and as the situation shows no sign of improvement it is attracting considerable attention. The previous warnings to young men contemplating chemistry as a vocation of the barrenness of the land they were entering appears to have produced but little effect. As in the other professions, the volunteers came bravely on, and now, it is not surprising to hear, they find it difficult to secure posts.

The preventive measures suggested are of the usual kind. Agencies that undertake to advise young people as to the choice of a career are to be instructed in the real conditions and prospects of the chemical industry—which sounds as if their advice in the past had not been too well founded. The heads of laboratories in German high schools are to examine applicants more severely as to their natural aptitude for chemical work, and the standard of the final examinations is to be further

raised to keep out all except those proved to be really capable of practice. Better than all these restrictive measures, however, are the positive steps to be taken to enlarge the scope for the employment of chemists, not only in chemistry itself but in allied branches such as the ceramic, gas, varnish, soap, and other industries, and to demonstrate through propaganda the higher value of the qualified chemist compared with the ordinary plant foreman. To this end, an opportunity is to be given to chemists, on the completion of their academical training, to acquire in special institutes practical knowledge of specific industries.

Books Received

- GENERAL CHEMISTRY. By Horace G. Deming. London: Chapman and Hall, Ltd. New York: John Wiley and Sons, Inc. Pp. 650. 17s. 6d.
 THE USE OF SOLVENTS IN SYNTHETIC ORGANIC CHEMISTRY. By Donald W. MacArdle. London: Chapman and Hall, Ltd. Pp. 217. 15s.
 ORGANIC SYNTHESIS. Vol. V. An Annual Publication of satisfactory methods for the preparation of organic chemicals. London: Chapman and Hall, Ltd. Pp. 110. 7s. 6d.

The Calendar

Feb.		
8	Birmingham University Chemical Society: "The Structure of Crystals." R. Robinson.	Birmingham.
8	Ceramic Society: "An Investigation into the Wedging of Dust-made Tiles." B. Moore. 7.30 p.m.	Central School of Science and Technology, Stoke-on-Trent.
8	Institute of Metals (Scottish Section): "Wire Weaving." James Gilchrist. 7.30 p.m.	39, Elmbank Crescent, Glasgow.
9	Society of Chemical Industry (Birmingham Section): "The Drying of Vegetables." A. W. Knapp. 7.15 p.m.	The University Buildings, Edmund Street, Birmingham.
9	Institution of Petroleum Technologists: "Sulphur Compounds in Kimmeridge Shale Oil." Dr. Challenger.	Aldine House, Bedford Street, Strand, London.
10	Institute of Chemistry and Society of Chemical Industry (South Wales Sections): "Some Notes on Pure Chemicals." E. A. Tyler.	Technical College, Swansea.
10	Royal Society of Arts: "Modern Views of Vitamins." Professor J. C. Drummond. 8 p.m.	John Street, Adelphi, London, W.C.2.
11	Institute of Metals (London): "The Fatigue of Metals." Part II. H. J. Gough and Dr. D. Hanson. 7.30 p.m.	85-88, Minories, Tower Hill, London, E.C.1.
11	Institution of the Rubber Industry (Manchester Section): "Rubber Softeners." W. N. Burbridge.	Manchester.
11	Optical Society: Annual General Meeting. 7.30 p.m.	Imperial College of Science and Technology, South Kensington, London.
11	Oil and Colour Chemists' Association: "Colour Measurement." L. C. Martin.	8, St. Martin's Place, Trafalgar Square, London, W.C.2.
11	British Science Guild: Conversation. 4.30 p.m. to 6.45 p.m.	Carpenters Hall, Throgmorton Avenue, London, E.C.2.
11	Chemical Society: Special Lecture, "Hæmoglobin." Professor J. Barcroft. 8 p.m.	University College, Gower Street, London, W.C.1.
12	Royal Institution: "The Chemistry of Blue and Red Colouring Matters in Flowers." Professor R. Robinson. 9 p.m.	Albemarle Street, London.
12	Institute of Metals (Sheffield Section): "Drop Forgings." Dr. O. F. Hudson. 7.30 p.m.	University, St. George's Square, Sheffield.
12	Institute of Metals (Swansea): "Observations on Copper Metallurgy." Capt. L. Taverner. 7.15 p.m.	University College, Singleton Park, Swansea.

The Chemist in the Works: Things to be Remembered

By Charles S. Roy, Ph.D., F.I.C.

In an address on "The Man in the Works," before the Northern Polytechnic Chemical Association on Tuesday, January 26, Dr. C. S. Roy summarised in simple but clear and practical terms the qualities required in a chemical works manager or technologist. We publish the following abstract of the address because it contains not only excellent advice to the beginner but suggestions that even experienced technologists cannot afford to neglect.

AFTER leaving college what is the main object of your life? To earn money. True, it is awful to leave the dream realms of the chemistry that you have been taught and to be suddenly transported into a works where everything is strange, from the plant and utensils used to the men. As you have perforce to earn a living—that is, obtain money—you should always remember throughout your experience, whether in the works, analytical or research laboratories, that money is the main factor throughout. Hence, when you devise a new process ask yourselves immediately—Is it feasible on the commercial scale? If the process seems good, then it is your business to adapt it to commercial needs.

In the analytical laboratory time is more than money, and your methods should be as short and accurate as possible. In the works, your main duty whether you be works manager or technologist is to see that nothing is wasted; for if waste goes on obviously dividends will be decreased.

The Beginner in the Works

You leave this Polytechnic with a thorough knowledge of the principles of chemistry, physics and technology. That knowledge you should keep up-to-date right through your career as a chemist or chemical technologist, for without it you cannot possibly make use of the most up-to-date methods in the fields of your work. Having got the knowledge your next aim should be to work out a process that will work commercially on a large scale. This you cannot do immediately you enter a works, for your technical education really only starts at that moment.

When you take up your first position in a works everything is strange, and you will find men who have been doing certain operations long before you were born carrying out these operations in a certain manner of their own. You must watch these men, and quietly store away in your head their methods of movement and their handling of the plant, for when you come to try this yourselves you will find that, although you are perhaps a third of the age of these men, you lack their surety of movement and quickness of decision. You must train yourselves to observe and remember, for plant manipulation is the most important part of the training of any works man. Later on you will control your workers better if they know and can see for themselves that you are a master of the plant you expect them to handle. No amount of bounce will deceive a skilled worker; hence be sure of your manipulation and of your knowledge.

It might be a little difficult at first to pick up all the tricks that are necessary in handling chemical plant, but really the only requirements are a co-ordination of the senses and a moderate application of common sense. I should advise you when starting in a works to spend half an hour or so in the evening just writing out what you have seen and to put the note aside; the next evening do the same, until the same process crops up again. Then you will be interested to note how many errors you have made. In this way you will be able to correct them and gain a sure knowledge.

Many chemical reactions that you have been taught are applied on a large scale, but their handling is a good deal different when you are working half ton or ton batches, especially of an expensive material. Your object is to avoid any loss whether of material or of time, hence from the start use all your senses, make a mental note of what you see, and remember it.

We are all endowed with certain faculties, and to bring all these faculties into use is solely a matter of training and of will. Many men will see only a quarter of what others see in exactly the same plant and process. Very few men can use hands, feet, eyes, nose, and ears at once, and it is essential that the chemical technologist should be trained to do so. For instance, you may be approaching a department where you know there are certain processes being carried out. You hear something unusual; you smell something unusual. You immediately enter the department and see

something unusual occurring. You ask why. Perhaps a man says the process is going wrong or the still is too hot. Then it is your duty to take charge immediately, and if possible correct whatever is going wrong. If it is a certain operation going on in a big still which has safety devices on it you will have to glue one eye on the sight glass, the other on the thermometer, and have one foot on the water cooling apparatus (if any), and a hand regulating either the vacuum or steam. Then you should be able to control the operation. This sounds complicated, but really it is the simplest thing possible if you only use common sense.

A Knowledge of Engineering

Now with regard to the design and use of chemical plant, the engineer must depend on the technologist for a rough idea of the plant required; therefore it behoves every student to make himself useful with a pencil and paper, to enable him to put his ideas as to plant in concrete form. The engineer will soon tell him, generally with great gusto, that it is impossible to do such a thing; then it requires altering so that it is mechanically possible. There are but few men who have no mechanical aptitude in these days of motor cars. Machinery is before everybody, and it is essential that the chemical technologist should have some knowledge of mechanics and mechanical engineering. Otherwise how can he arrange his plant for the most economical use of labour? I have seen most wonderful plant erected which would work very well if everything were reversed, as for instance, a wonderful series of pumps to pump fluids from one tank to another, when the whole operation could be effected by gravity without the cost of any power at all. When dealing with plant, do away with all such mechanical operations as Nature will carry out for you. The man with mechanical aptitude has a distinct advantage in a works. It makes his surveys a good deal easier, and it helps him very considerably in dealing with the mechanical part of his work. For instance, if a pump develops a bad knock his ears will tell him long before he is near it that it is not working correctly, and when he gets near he will be able to discern by ear between valve troubles and bearing troubles. His hand on the inlet pipe will tell him immediately whether the fluid being pumped is too hot or too cold.

It is an advantage if the technologist has some knowledge of the first principles of building construction. When he is interviewing his builders and giving instructions he will feel very silly if he does not know fully what he requires, and you would be surprised at the number of technologists or works chemists who have only a very meagre knowledge of such matters.

From the foregoing you will see that the man in the works is to have, besides his chemical knowledge, a certain amount of mechanical common sense.

You will say, what an existence! In the first place when we enter the works we must think of nothing but money, and it seems as if our lives will be spent in going round devising ways and means of saving money. That is all it really means, for in a works ideas are of no use unless they have some direct or indirect commercial bearing.

With regard to your chemical knowledge, this must be kept up by a systematic reading of the periodicals and publications. Should you want a hobby, you can carry out your research ideas in the evenings, and you have Saturdays and Sundays, but whatever you do, do not try to make yourselves into walking encyclopædias of chemical knowledge, because if you do the immediate result will be that you will restrict your power of application. When reading your publications make a note of the items that interest you for future reference, and know where you can lay your hands on any information you may require. Do not try and commit everything to memory; for one thing that is impossible, and for another it is of no use to you.

The Importance of Costing

When dealing with the commercial side, the man in the works has to face the question of costs. Has it ever struck you that a works costs money even when there is no work being carried on there? If it is lying idle it is losing interest on the capital supplied. In a works as a going concern the works technologist or manager is immediately burdened with the cost of his administrative staff, his clerks, the upkeep of his prime movers, the warehousemen and porters, the analytical and research laboratories, the rates and taxes, and also his own salary. First of all, in any undertaking he has to cover these enormous charges. Some are constant, such as rates and taxes, and rent (if any). Some are variable, such as fuel, water, non-productive wages, etc. Then he also has to pay his productive staff which, on an average, is about two-thirds of his works man-power. Another charge he must carry is an emergency charge. When dealing with expensive material this is rather important, as accidents may happen and he may lose his product. This has to be covered.

To get at the cost of a product I find in general it is best to take the constant charges for a period of three months and variable charges for a period of a month, and as this has only to be split up in proportion on the productive wages, naturally the simplest method is to allocate this on the personal wages of the men. Of course, in isolated departments where you can instal steam, water, gas and electric meters, the task of costing is very considerably lightened. An adjustment must be made when you are dealing with very expensive plant, as obviously the capital charge on this is a good deal more than on cheap steam pans, etc.

You will find when you go into these figures that you will have to allocate a charge of so much per hour per man. This, in the course of my experience, I have found the most satisfactory, as it is a figure that can be easily adjusted, and costs can be regulated at frequent periods. The output of your departments is recorded daily or weekly, and where it is a constant and regular product you can always check back your costs at the end of three, six or twelve months.

The Presidency of the Chemical Society

Successor Nominated to Dr. Crossley

DR. A. W. CROSSLEY, director of the British Cotton Industry Research Association, Didsbury, who was elected president of the Chemical Society at the last annual meeting, has been prevented by ill-health from completing his term of office. The Council has passed a resolution recording its regret at Dr. Crossley's wish to resign the presidency at the close of his first year of office on the ground of ill-health, and expressing its sincere thanks for the services he has rendered as president and its best hope that his recovery may be speedy and complete.

The Council has already nominated as his successor Professor Herbert Brereton Baker, M.A., D.Sc., F.R.S., Professor of Chemistry in the Imperial College of Science and Technology, South Kensington, since 1912. The election will take place at the annual meeting in Manchester on March 25, that being the first occasion on which the Chemical Society has held its annual meeting outside London.

The new President-nominate, who is a native of Blackburn, was educated at the Manchester Grammar School, and proceeded to Balliol College, Oxford, on a Natural Science scholarship in 1879. He graduated in the first class Final Honour School in Natural Science in 1883 and for the following two years served as demonstrator in chemistry at Balliol. At Oxford, in his undergraduate days, his attention turned towards the influence of moisture on chemical reactions, a subject on which he has since become the greatest living authority. Subsequently, while Science Master at Dulwich College, he carried on work on these lines which he had already commenced at Oxford; and investigated a number of chemical reactions, especially between gases. He showed that many reactions which normally occur may be completely inhibited if the reacting substances are carefully dried, demonstrating, among other things, the astonishing fact that carefully dried hydrogen and oxygen may be heated to the temperature of molten silver without explosion—an achievement

which occupied ten years of careful work, partly in conjunction with F. R. L. Wilson. During this period he received great encouragement from Professor H. E. Armstrong. Some of the work was carried on in the laboratory at Shrewsbury School, where his brother is Science Master. Latterly he has shown that no reaction occurs when a dry mixture of hydrogen and oxygen is exposed to ultra-violet light.

Prior to the war, Professor and Mrs. Baker found that

liquid nitrogen trioxide, on careful drying, displays a remarkable rise in boiling point. Arising out of this observation, a number of liquids were set to dry in 1914. The war intervened, and for several years Professor Baker was fully occupied with work arising out of gas warfare, particularly in devising protective measures. Consequently the liquids above-mentioned went on drying for some eight years, till in 1922 a first-class sensation was created in the scientific world by the announcement that the boiling points of the liquids had risen far above the values found usually, that of benzene, for example, rising by some 40° C. These results have given rise to much discussion, and the investigation of the problems that they raise is being carried on all over the world.

Professor Baker (in conjunction with A. H. Bennett) also spent many years in a careful examination of the element tellurium, it being thought,

on the basis of the Periodic Classification of the elements, that another element might be present.

In addition to the posts already mentioned, Professor Baker has filled among others the office of Dr. Lee's Reader in Chemistry and Tutor of Christ Church College, Oxford. His great services to science have been recognised by the award of the Longstaff Medal of the Chemical Society in 1912, and of the Davy Medal of the Royal Society in 1923. In his scientific investigations Professor Baker has found an able and enthusiastic collaborator in his wife, whose name is associated with his own in the published results of some of his researches.



PROFESSOR H. B. BAKER.

THE COMBUSTION OF SOLID FUEL				
THE COMBUSTION OF SOLID FUEL INVARIABLY TAKES PLACE IN TWO STAGES. IN THE FIRST STAGE THE SOLID IS CONVERTED INTO COMBUSTIBLE GAS BY THE ACTION OF AIR, OR OF AIR AND STEAM, OR IS PARTIALLY GASIFIED BY THE ACTION OF HEAT ALONE. IN THE SECOND STAGE THE COMBUSTIBLE GAS IS BURNED WITH SECONDARY AIR. THE PROCESSES BY WHICH THE COMBUSTION OF THE FUEL IS EFFECTED ARE ARRANGED IN ORDER OF DIMINISHING QUANTITY OF AIR REQUIRED FOR THE PRIMARY, OR GASIFICATION STAGE.				
CLASS.	FUEL USED.	NATURE OF PROCESS.	APPLICATION.	PRODUCTS.
A	FIRING WITH PULVERISED FUEL.	THE FINELY GROUND COAL IS INJECTED INTO THE COMBUSTION CHAMBER WITH SUFFICIENT AIR FOR COMPLETE COMBUSTION. THE PROCESS APPROACHES MOST NEARLY TO SINGLE STAGE COMBUSTION.	STEAM RISING, FLYING DUSTS, ETC.	WASTE GASES, ASH.
B	HAND FIRED FURNACES.	THE FUEL IS SPREAD OVER THE GRATE BY HAND. PRIMARY AIR ENTERING AT THE BOTTOM OF THE FUEL BED THROUGH THE FIRE BRICK GASIFIER OF THE FUEL, & THE GAS & VOLATILE MATTER IS BURNED BY MEANS OF SECONDARY AIR ENTERING THE SERVICE CHAMBER. THE FUEL BED IS KEPT CONSTANTLY BURNING BY THE PRIMARY AIR ENTERING THROUGH THE FIRE BRICK.	STEAM RISING, HEATING FURNACES GENERALLY.	WASTE GASES, ASH.
C	FURNACES WITH MECHANICAL STONERS AND MECHANICAL DRAUGHT.	AS ABOVE BUT WITH PERFECTED MECHANISM. FUEL AND AIR ARE SUPPLIED TO THE FURNACE AT A CONSTANT RATE, AND THE DEPTH OF FUEL AND AIR ON THE BED REMAINS CONSTANT, SO THAT COMBUSTION IS UNDER PERFECT CONTROL.	CHIEFLY FOR STEAM RISING.	WASTE GASES WITH LITTLE EXCESS AIR AND LITTLE SHAKE. ASH.
D	COAL OR COKE.	THE FUEL BED IS USUALLY OVER 2'-0" IN DEPTH. AIR IS PRESSED INTO THE BOTTOM OF IT, AND THE GAS PRODUCED IS BURNED BY SECONDARY AIR INTRODUCED THROUGH SPECIAL CHANNELS OPEN AT SOME FEET FROM FUEL BED.		TYPICAL GAS FROM COAL. CO 31; CO 28 H ₂ 6; CH ₄ 2 N ₂ 61 TYPICAL GAS FROM COKE. CO 61; CO 57 H ₂ 10 CH ₄ 0.6 N ₂ 57.8 (Coke steam)
E1	SLACK COAL.	AIR SATURATED WITH STEAM 55° TO 60°C. IS BLOWN UPWARDS THROUGH THE FUEL BED IN THE PRODUCER. THE COAL FEED, THE LEVELLING AND ROTATION OF THE FUEL BED, AND THE REMOVAL OF THE ASH ARE CARRIED OUT MECHANICALLY.	FOR HEATING OPEN HEARTH STEEL FURNACES, BILLET FURNACES, GAS FURNACES ETC. OPERATED SEPARATELY. FURNACES CAN BE PLACED AT A DISTANCE OF 100 TO 300 FT. FROM PRODUCER. COOLERS DISTANCE INVOLVES LOSS OF HEAT AND COMBUSTIBLE MATERIAL.	PRODUCER GAS USUALLY 140 - 150 B.T.U. AT 700° PASSED NOT TO FURNACE CO 4 CO 57 H ₂ 10 CH ₄ 3 N ₂ 50
E2	SLACK COAL.	AIR SATURATED WITH STEAM AT 80° TO 85°. OTHERWISE AS ABOVE.	FURNACES OPERATING AT LOWER TEMPERATURE THAN ABOVE. GAS ENGINES. THERMAL EFFICIENCY LOWER THAN ABOVE.	PRODUCER GAS ABOUT 150-160 B.T.U. COOLED IN RECOVERY PROCESS. CO 16; CO 12 N ₂ 24; CH ₄ 3; N ₂ 45 ALSO TAR & AMMONIA.
F1	COKE.	AIR IS BLOWN INTO THE FUEL BED IN THE WATER GAS GENERATOR UNTIL THE TEMPERATURE IS SUFFICIENTLY RAISED AND THEN STEAM IS BLOWN INTO IT TO PRODUCE WATER GAS.	USED FOR WELDING & HEATING SMALL METALLURGICAL FURNACES. IN GAS WORKS PRACTICE IT IS USED TO PRODUCE WATER GAS. WATER GAS PRODUCED CAN BE SHUT DOWN & STARTED UP AT SHORT NOTICE.	GAS 280 - 295 B.T.U. 50,000 - 60,000 CU FT PER TON OF COKE. CO 55 CO 31 H ₂ 44 CH ₄ 0.5 N ₂ 6
F2	COKE & MINERAL OIL.	WATER GAS IS ENRICHED BY PASSING IT WITH SPRAYED OIL INTO CHAMBERS CONTAINING HEATED BRICKWORK.	USED IN GAS WORKS PRACTICE TO BRIDGE OUTFALL OF GAS & TO UTILISE SURPLUS GAS COKE.	GAS UP TO 550 B.T.U. CO 5 CO 35 H ₂ 39 CH ₄ 10 C ₂ H ₆ 5 N ₂ 6
G	BITUMINOUS COAL.	PROCESS ANALOGOUS TO WATER GAS PROCESS.	USE AS FOR WATER GAS.	GAS OF 360 B.T.U. OR UP TO 550 B.T.U. WHEN ENRICHED.
H1	PREFERABLY WASHED & CRUSHED COAL.	COAL IS CARBONISED BY THE HEAT GENERATED BY PARTIAL COMBUSTION WITHIN THE OVEN.	MANUFACTURE OF METALLURGICAL COKE	THE GAS & VOLATILE PRODUCTS ARE WASTED. COKE IS THE ONLY PRODUCT.
H2	DO.	COAL IS CARBONISED IN CLOSED RETORTS HEATED EXTERNALLY BY GAS PRODUCED BY DISTILLATION.	MANUFACTURE OF METALLURGICAL COKE & RECOVERY OF TAR, BENZOL ETC. AND AMMONIA.	COKE, TAR, BENZOL, AMMONIA.
H3	DO.	AS ABOVE BUT RETORTS ARE HEATED BY PRODUCER GAS PRODUCED BY PROCESS F ABOVE.	AS ABOVE BUT THE RICH DISTILLATION GAS IS NOT BURNED AROUND THE RETORTS.	COKE, TAR, BENZOL, AMMONIA & GAS FOR TOWN SUPPLY.
J1	WASHED & CRUSHED GAS COAL.	THE COAL IS CARBONISED IN CLOSED RETORTS HEATED BY PRODUCER GAS GENERALLY FROM COKE (SYSTEM D) IN VERTICAL RETORTS THE GENERAL TEMPERATURE MAY BE AS HIGH AS 1500-1550°C & STEAM IS ADMITTED TO INCREASE OUTPUT OF GAS. WITH HORIZONTAL RETORTS LOWER TEMPERATURES ARE USED & LESS GAS IS OBTAINED OF HIGHER CALORIFIC VALUE.	MANUFACTURE OF GAS FOR TOWN SUPPLY.	13,000 TO 18,000 CU FT OF GAS PER TON OF COAL. CALORIFIC VALUE 550 TO 450 B.T.U. THE AMMONIA, BENZOL & COKE. CO 3-5; CO 8-12 H ₂ 40-50 CH ₄ 17-24; C ₂ H ₆ 2-4 N ₂ 10-15
J2	DO.			
J3	DO.			
K	BITUMINOUS COAL.	PARTIAL CARBONISATION OF COAL AT ABOUT 700°.	PRODUCTION OF SMOKELESS FUEL, MOTOR SPIRIT & GAS.	SEMI-COKE, MOTOR SPIRIT, GAS UPWARDS OF 600 B.T.U. MOTOR SPIRIT, Up to 1 qt.

Combustion of Solid Fuel

A Classification of Methods

On the opposite page is a reproduction of a chart prepared by Dr. M. W. Travers, F.R.S., London, illustrating the various methods of solid fuel combustion. The objects of the chart and the circumstances under which it was prepared are described in the interesting notes below, kindly supplied by Dr. Travers.

IN March of last year I was invited to join a Committee of the Association of British Chemical Manufacturers for the purpose of organising an exhibit at Wembley illustrating the uses of coal and other common raw materials. Being mainly interested in combustion processes, my thoughts turned naturally in the direction of working out a scheme for illustrating the uses of coal as a fuel. Looking up such text books and technical works as were available, I found no hint of a system of classification which would be helpful as a basis for such an exhibition or for a course of lectures on the subject. Writers on the subject of fuel, or on combustion in general, usually divided up the subject so as to bring similar types of commercial fuels together, or so as to make the discussion of similar industrial processes the subject of each section. I was seeking for some basis of a more fundamental character, so I decided to go back to the beginning and attempt to devise a system of classification based upon the mechanism of the process of combustion of solid fuel in general.

I did not propose to go back so far as to deal with the mechanism of the changes taking place at the surface of the particles of carbon, or to discuss the mechanism of the formation of the gaseous products of carbon. I was content to take as a starting-point the work on combustion in the fuel bed carried out by the American Bureau of Mines, the results of which were published in Technical Paper 137 of the year 1917. The conclusions as to the main changes taking place in the fuel bed of a furnace, or gas producer, into which air is forced from below, but in which channelling does not take place are:—

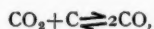
- (1) Whatever the blast velocity in the fuel bed, a depth of four inches is sufficient for the removal of the whole of the oxygen.
- (2) At this depth in the fuel bed, the carbon dioxide content of the gas in the fuel bed has reached and passed a maximum of 10 to 16 per cent.
- (3) At the surface of a fuel bed six inches deep, the gas contains no oxygen and usually 6 to 8 per cent. of carbon dioxide and 20 to 30 per cent. of combustible gas, according to the nature of the fuel.
- (4) Complete combustion cannot be effected by means of air injected through the fuel bed, but only by the admission of secondary air above the fuel bed.

Some Conclusions

The conclusions arrived at in this paper were, perhaps, not entirely new in the year 1917, but the paper does bring out the fact that in designing combustion processes full regard must always be given to the fact that the combustion of solid fuel takes place in two stages, and the design of the process must be such as to allow of each stage being carried out efficiently. In every case in which the fuel contains volatile matter, destructive distillation and the formation of a coke residue must be considered as a preliminary, for it is the gasification of the coke with which we are now concerned.

The total quantity of oxygen required for the complete combustion of a quantity of solid fuel is always the same, by whatever process, and in whatever stages it is effected, and whether steam plays a part in the gasification stage or not. Thus, if the pulverised fuel process could be effected as a single stage process, 32 lb. of oxygen would have to be injected as primary air for every 12 lb. of carbon in the fuel. In practice, it is not possible to effect complete combustion by primary air injected with the fuel, but some secondary air must be injected by a separate blower.

Placing the pulverised fuel systems in Class A, we pass through successive stages in which the fuel is gasified by air alone, and in which increased contact of the gases in the fuel bed with hot coke brings us towards realisation of equilibrium in the reaction:—



which is approached in the deep fuel bed of gas producers

such as are used in gas retort settings, when 90 per cent. of the carbon gasified may appear as carbon monoxide, and about half of the air required for the combustion of the fuel must be supplied as secondary air. In this way, using only air for the gasification of the fuel, and in diminishing quantity, we pass from Class A to Class D in the scheme.

The reduction of primary air can be effected in successive stages by the use of primary steam, till we come to section E2, which includes the "Mond" recovery gas producer system.

We now come to systems in which primary air is used only indirectly, the products of gasification by air not appearing in the gas, and lastly to methods in which gasification, or rather partial gasification, is effected by heat, and without the use of primary air.

Such a system of gasification is necessarily incomplete; but classification plays a very important part in scientific development, and the scheme which I have put forward may not only be of use to those who are writing and lecturing on the subject, but may serve as a basis for future discussion.

M. W. TRAVERS.

147, Queen Victoria Street, E.C.4.

"From College to Works"

To the Editor of THE CHEMICAL AGE.

SIR,—While agreeing with Sir William Pope's contention that the preliminary training (for it is nothing more) received by chemists in our colleges should be a general one, I venture to emphasise once more that this alone is of lesser consequence than the nature of this general training. The foundation of such a training should be the teaching of the underlying principles of research and this condition is hardly met in the ordinary college course, founded as it is upon text book information and a certain amount of laboratory practice. A training of facts and the theories in vogue at the moment is hardly an efficient substitute for a knowledge of the general requirements of research.

Like Mr. Chaston Chapman, I have had, in the past, a large number of chemists and engineers working under me, and most of the former have at times been dissatisfied with their lack of knowledge of the things which really matter, and have, rightly or wrongly, ascribed this deficiency to the nature of their college training. They have almost invariably referred to the absence of training in research; and in some cases have stated that they never came into actual contact with research conditions, or research, while at college.

Now this is a point which clearly affects our future as an industrial nation. Since 1904 I have held that this training can be imparted by making the student realise that he is working in a department of chemical research, and that he is receiving a training in the standard methods used for carrying this out. If this is agreed, the more general the training the better.

It is interesting that the engineers have not expressed themselves so strongly about their training, nor have they found themselves at a visible disadvantage when engaged upon industrial research. If there is anything wrong with our chemical training, the sooner we discover what this is the better.—Yours, etc.,

W. P. DREAPER, O.B.E., F.I.C.

Hampstead Heath, N.W.3.

The Evolution of Colloid Mills

To the Editor of THE CHEMICAL AGE.

SIR,—We have read with great interest the excellent article under the above heading in the January 30 issue of THE CHEMICAL AGE by Dr. S. P. Schotz. There is just one point which we should like to direct your readers' attention to, and that is the substance of the footnote on page 100, referring to the circulating device embodied in our Patent "Circulator" Mill. The footnote reads: "This function could probably be made part and parcel of every known colloid mill," etc. Probably it could, but the patent for this circulating device is owned by us, and as it is a very important and valuable feature of our mill, we should naturally take steps to protect our rights in the event of infringement.—We are, etc.,

FOLLOWS AND BATE, LTD.,

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February 1.

WM. H. BARNES,
Managing Director.

Training Chemists for Industry

Mr. F. H. Carr Suggests a New Degree

At the meeting of the London Section of the Society of Chemical Industry on Monday, under the chairmanship of Mr. C. S. Garland, Mr. F. H. CARR read a paper on "The Training of Chemists for Industry."

The chemical industry of to-day, Mr. CARR said, required for the purpose of works processes a different type of man from that now turned out by our universities and technical colleges, and he accused educational authorities of not endeavouring to ascertain the real demands of industry. Whilst the ordinary post-graduate course turned out splendid men as research chemists and leaders of industry, the great demand was for men who had been trained primarily with a view to carrying out works processes. He appealed for a third type of training over a period of three years as a minimum and five years as a maximum, and suggested that the best students would be sons of mechanics, carpenters, and so on, in whom there was an inherited sense of craftsmanship which fitted them peculiarly for the work he had in mind. Authorities had been carried right away from the training of the exact type of man who was needed on the productive side of chemical industry and who at present developed up from the foreman type.

Mr. Carr suggested that instead of a B.Sc. or similar degree, there should be another degree to give the type of men mentioned a status in the works equivalent to the status enjoyed by the B.Sc. in the laboratory. Engineering and chemistry must be taught side by side, but the great thing was to get away from the traditions of the universities and technical colleges of to-day. The great bulk of students were suited only for laboratory and research work and very few as leaders of industry. The intermediate type to which he referred was completely overlooked.

Critical Discussion

The CHAIRMAN, emphasising the need for chemical engineering training, said that Dr. Ruttan, of the University of Montreal, had told him that he was able to place his chemical engineering students into posts at the end of their training, whereas there was quite a considerable percentage of students trained only as chemists whom he could not place into works.

Professor W. A. BONE said that according to Mr. Carr, apparently, for some reason or other, someone had failed in some particular, but for the life of him he could not find out who had failed and where the failure had been. If Mr. Carr had been a little more definite in his accusations and more precise in his definition of the type of man he wanted and how he proposed to get him, it would have been easier to discuss his views. He doubted whether giving students parallel courses of chemistry and engineering over a three years' period would provide a type of man which would be of any great value to industry.

Professor PICKARD and Mr. R. COLLETT suggested that industrialists should state what prospects they were prepared to offer students who had been trained in the manner suggested. The former said that he had found great difficulty in securing openings in works for students so trained, but it was pleasing to know that he could now apply to Mr. Carr.

Mr. E. KILBURN SCOTT expressed regret at the closing down of the Finsbury Technical College, which had been one of the few places in London which gave the type of training Mr. Carr desired. He stressed the need for men suitably trained to take charge of the processes in connection with combustion engineering, and pointed out the great opportunities for chemical engineers in the Colonies, and facilities for training them should be provided here. He recommended the adoption of the "sandwich" system in conjunction with chemical and chemical engineering training.

Dr. W. CULLEN said the impression in many works in the country to-day was that the chemists as now turned out were no good, and he suggested that a resolution be passed convening a meeting of industrialists, educational authorities, and possibly some of the chemists, to deal with the whole problem.

SIR ROBERT ROBERTSON did not agree that a man trained on the lines suggested would be the value to industry that Mr. Carr hoped for.

Mr. CARR briefly replied and maintained that a third type of training was necessary.

Experiments in Surface Action

Lecture by Dr. Eric Rideal

THE first of two lectures on "Surface Action" was delivered by Dr. Eric K. Rideal (Owen Jones Lecturer on Physical Chemistry at the University of Cambridge) before the Royal Institution of Great Britain on Tuesday. Dr. Rideal emphasised the fundamental importance of colloids, and pointed out the value of surface chemistry as a means of obtaining some insight into the processes taking place in colloids. The first lecture was devoted to a consideration of liquid surfaces, and it is proposed in the second, on February 9, to deal with solid surfaces.

Liquid Surface Experiments

Experiments were carried out for the purpose of demonstrating some of the actions taking place on the surfaces of liquids. A drop of oleic acid placed on the surface of water, spread over the surface, whilst at the same time minute drops were formed in violent agitation. In the case of carbon disulphide no such change took place, but the drop remained quietly on the surface of the water as a lens. The oleic acid, however, did not spread out indefinitely; after a short time the agitation ceased and the small drops came to rest. If these were collected together they would remain in the form of a lens, slightly smaller than the original drop placed on the surface. A small quantity of oil was left on the surface of the water.

Why and how did the oleic acid spread on the surface, but not the carbon disulphide; how rapidly did the acid spread; and why did it eventually stop spreading? A partial answer to some of these questions was supplied by an experiment in which a hanging ring was placed in the water surface and its weight counterpoised, so that the weight was not sufficient to tear the ring off the surface of the water. Oleic acid was dropped on to the water a short distance from the ring, and after a short but definite interval of time the ring separated from the water surface. Clearly, therefore, oleic acid spread on the water and lowered the surface tension. The rate at which it spread could be measured, and a table was given showing the rate of spreading of myristic acid at various temperatures. A small circular rod of the acid was dropped into the water, and the rate of spreading increased with the temperature. The linear velocity of travel was of the order of 25 cm. per second for oleic acid; it was much smaller than that of a nerve impulse, with which it was frequently compared, which was 60 metres per second. The tendency to spread, or the spreading co-efficient, might be determined by measurement of the surface energies of the three surfaces present—the water, the oil, and the oil-water interface.

The lowering of the surface tension of the water effected by the oil drop could be readily determined at the point at which spreading stopped and equilibrium was attained, and it was effected by alteration of temperature, as was shown by various curves. The work of various investigators had shown that in the majority of cases the oil film was but one molecule thick. By dropping a small quantity of palmitic acid dissolved in benzene on the water, spreading rapidly took place, the benzene evaporated, and left a thin film of palmitic acid on the water. By contracting the surface area with a glass slide the surface film was compressed until the palmitic acid molecules touched one another. On touching, they stuck to one another, and the surface was covered with a solid film of palmitic acid. In his experiment, Dr. Rideal placed about 0.013 mgm. of palmitic acid on the surface, and the area of the solid film was about 90 sq. cm. Hence the area of each molecule was about $30 \cdot 10^{-18}$ cm., or 30 \AA^2 . Thus, with a metre rule, molecular areas might be determined.

Nearly all the organic substances which, spread on water contained polar groups, such as the $-\text{COOH}$, $-\text{OH}$, $-\text{NH}_2$, or SO_3H group. These rendered insoluble hydrocarbons soluble in water. They would thus expect molecules of oleic acid to spread out from the lens by being caught in the water at the polar $-\text{COOH}$ group. These entered the water around the lens, and, desiring as much water as they could get, the molecules spread out in an ever-expanding ring. When the ring reached the sides of the dish the surface was covered, but more molecules crowded into the water and compression of the film commenced. During the process of packing the floating film of orientated molecules might undergo several

changes of state, forming first a two-dimensional vapour, then a two-dimensional liquid, termed by Adam an expanded film, and finally another more closely packed liquid, or occasionally a solid—the condensed film.

The Phenomenon of Sensitisation

Associated with the interfaces was the phenomenon of sensitisation. If an emulsion of gum benzoin in water was prepared, and stabilised with saponin, a relatively large addition of salt was required to effect precipitation. On the addition of substances like albumen or globulins the gum benzoin emulsion was more easily precipitated, whereas colloidal gold was rendered less sensitive to salts by the addition of albumen or globulin. It seemed that stabilising agents, such as sodium oleate, exerted their properties by presenting to the aqueous phase a number of polar groups, which became hydrated, and thus lowered the interfacial surface tension. If they imagined that these polar groups were relatively acidic, then, on the addition of a protein which contained but a few polar basic groups, they might expect that the acid groups of the protecting agent would combine with the basic groups of the sensitising agent, decreasing the number of polar groups and the stability of the complex colloid. These considerations, although somewhat speculative, at least gave a ready interpretation of the extraordinarily selective action of certain globulins in the sensitisation of suspensions.

Indian Chemical Notes.

(FROM OUR INDIAN CORRESPONDENT.)

THE quinquennial review of the Forest Administration in India gives a detailed description of the progress made in research in forest products, with special reference to the work carried on at the Dehra Dun Research Institute. The Economic Branch has now six sections, viz.: wood technology, timber seasoning, timber testing, wood preservation, minor forest products and paper pulp. Dr. Brown, of Syracuse University, U.S.A., spent some years at Dehra Dun, when he investigated the structures of Indian timber. He has prepared an elementary manual of wood technology for the forest students.

Experimental Plant

For the Seasoning Section, two Sturtevant and three Tie-mann kilns were erected and a great deal of experimental work has been done with these kilns, with a view to discovering the best methods of seasoning of important Indian timbers. Considerable progress has also been made in the air seasoning of these timbers.

In the Timber Testing Section, much progress has been made and well-equipped timber-testing shops have been established, containing modern machines for testing timber in all the various ways that have been worked out in the United States, Canada, and Great Britain.

For wood preservation, a large modern experimental preservation plant has been installed and many timbers have been treated with a number of different preservatives. Elaborate records are being maintained showing moisture content, the quantities of preservatives taken up, and other details, which are required to determine the value of the preservation of timber for use in India. A large number of these experiments have been carried out with railway sleepers, as very large quantities of Indian timbers are used for this purpose, and this is an inquiry of the utmost economic importance.

In the section of Minor Forest Products, a certain amount of progress was made in the investigation of numerous forest products and the dissemination of information to inquirers, but the progress made in this section was by no means all that might be desired, because it was found necessary, owing to financial stringency, to dispense with the services of a special officer.

Work of the Chemical Branch

The work carried out by the Chemical Branch during the five years period was concerned with investigations into gums, resins, oleo-resins and essential oils. The turpentine from *Pinus longifolia* was further examined and its constitution reported on. Study of the turpentine derived from all the species of pine occurring in India has now been completed, and the results have been published in the Forest Records. Oils from grasses, such as *Andropogon*, were analysed and other plants which yield oil from various parts were also investi-

gated. These included the leaves of the Himalayan Cypress, leaves of Himalaya Juniper, root-bark of Morinda, leaves of Skimmia, seeds of Zanthoxylum, Deodar wood-oil, camphor leaf-oil from Formosa, camphor grown at Dehra, seeds of Garcinia, and leaves of blue pine. The Forest Chemist has also assisted other branches in subjects such as the constituents of wood preservatives and the valuable properties in certain minor products.

S. G. W.

Society of Glass Technology

THE January meeting of the Society of Glass Technology was held in the Manchester College of Technology on January 20-21.

A discussion on "Refractory Materials for Glass Making" was introduced by Mr. E. A. Coad-Pryor with a paper on "The Use of Refractories in the Glass Industry." He suggested that a meeting of manufacturers might well be held annually to discuss failures and new proposals. He referred to the making and firing of tank blocks. Great differences were observed in blocks from different makers, but having the same porosity, refractoriness, and nearly the same firing temperatures. The mode of operation of a furnace and the kind of clay used seemed to be very important factors in the behaviour of a refractory material. The X-ray examination of blocks was advocated as a means of detecting flaws, the cost of a suitable equipment being given as £350 to £500. He thought that users would pay 10s. per ton more for blocks examined in this way, and a central testing station might well be instituted.

The following papers were also presented:—

- (1) "Some Experiments upon the Development of Sillimanite Refractories for Glass," by W. Angus McIntyre.
- (2) "The Manufacture of some Experimental Tank Blocks and their Behaviour in Service," by W. Angus McIntyre.
- (3) "Note on a Design for a Glass Pot-Board," by F. Winks, M.Sc.Tech.
- (4) "Some Tests on Bottle Glasses with the View to Prescribing Standards of Composition," by H. S. Blackmore B.Sc.Tech., and Professor W. E. S. Turner. Professor Turner observed that it was desirable to fix upon a rapid test which could be applied under works conditions by a person not particularly expert. The present paper was an interim report on the results of tests of bottles of different compositions.
- (5) "The Homogeneity of Glasses Melted in Pots under Manufacturing Conditions," by Edith M. Firth, B.Sc., and Professor W. E. S. Turner, D.Sc. Several types of glasses were melted under fairly well specified commercial conditions, without stirring. The general conclusion reached was that non-stirred commercially produced glass had a surprising homogeneity of composition throughout the pot in which it was melted.

The Work of Public Analysts

MR. H. T. LEA, M.Sc., Halifax Borough Analyst, lectured on Thursday, January 28, to the Halifax Scientific Society on "The Progress of Municipal Chemistry."

In giving some history of municipal chemistry, Mr. Lea said that the Sale of Food and Drugs Act owed its origin to work among chemists and public analysts, but especially to the pioneer Dr. Hassell (1853). This Act, partly because there were very few public analysts, was not very operative. A second Act in 1872 suffered from the same trouble. Another committee of inquiry advised analysts to form themselves into a body. This body became advisory to Parliament with regard to adulteration, and a Public Analysts' Society was formed in 1874, and in 1875 there came the Sale of Food and Drugs Act.

Mr. Lea explained how this Act was administered. There were about 100 public analysts in the country. Each large borough had one, and the country districts were covered by County Council analysts. Some public analysts were appointed as whole-time men, their laboratories, equipment, and associations being provided by the Corporation. This obtained in Hull, Manchester, Salford, Liverpool, and other big cities. In Halifax and places of similar size, the remuneration given was not sufficient to employ a whole-time man, and they combined, with the work for the Corporation, analyses of trade samples, and similar work for individuals or firms. He expressed the opinion there was room for the tightening up of the law in respect of labelling goods, particularly on the outside, and for the fixing of standards for many commodities.

Financing Paint Research

Manufacturers' Federation Scheme Outlined

It was announced at the annual dinner of the Paint and Oil Section of Glasgow Chamber of Commerce on Thursday, January 28, that arrangements were being made for a scheme of research into various problems affecting the trade in order to assist production and to enable exporters to meet competition in the foreign markets.

Mr. P. P. Rankin, convener of the section, presided, and the company included Mr. A. Selby Wood, president of the National Federation of Associated Paint, Colour, and Varnish Manufacturers of the United Kingdom.

Mr. A. Selby Wood gave the toast of "The Paint and Oil Section." On certain conditions, he said, the Government was prepared to put down pound for pound that any trade was prepared to spend in having its problems thoroughly examined. A few months ago it was suggested that the paint, colour, and varnish industries should do this. Before the war they were in the happy position of making the largest contribution to the export trade of the world so far as their commodities were concerned. That position had, however, been seriously assailed in recent years. During the war they were not allowed to export, and their competitors, particularly the Americans, who previously had not been able to get a footing in South America, China, and other countries, had the foreign markets to themselves. Nowadays exporters in this country were finding it more and more difficult to hold their share of the export trade.

The Americans were spending on research £10 for every £1 that was being spent in Britain, and unless they took action there was no doubt what their position would be in the long run. The research they were proposing to undertake was to cost the Federation £2,500 a year for five years, and the Government was prepared to double that amount. It was computed that if they put a levy of only ¼d. per cwt. on all the paint and colour exported from this country they would raise at least £3,000. In the short time the matter had been before their members they had obtained about two-thirds of the £2,500. This was a very urgent matter to their trade. Some important problems, for instance, had recently engaged the linseed oil trade, and these would form the subject of experiment and investigation.

Costing in Chemical Works

An Aspect Neglected in Training

A MEETING of the Nottingham Section of the Society of Chemical Industry was held on Wednesday, January 27, when Mr. H. Calam, M.Sc., F.I.C., read a paper on "Costing in Chemical Factories."

Mr. Calam said that chemical manufacturing might be regarded as a trade and craft rather than a pursuit of merely academic interest. The major outlook of the chemist was to produce saleable goods at a profit and not merely to discover and classify chemical curiosities. To the young chemical industrialist, the problem of costing the results of his labours or the deduction of probable costs of the results of his researches would meet him immediately he made his first move on entering a chemical works, however small a producer he might be. It was best that he should not meet it as a stranger. Chemical teaching of to-day carefully avoided the commercial aspect of the science, and this attitude urgently called for correction. Factory costing had been defined as the allocation of factory expenditure requisite for the computation of the cost of a unit of production in the terms of money. In addition, other costs such as sales costs, transport, etc., had to be borne in mind.

Mr. Calam explained various terms employed and gave examples of methods of computing the total cost of production of a manufactured product. The allocation of the correct proportion of expenditures involved, which were not directly or solely connected with the manufacture of a particular product, was discussed in some detail, such as overhead charges, etc.

In a good discussion that followed, many difficulties were cited, for instance, the proportion of cost between the desired product and by-products; should research be an overhead charge as indicated by Mr. Calam? Thus, if by research a

process which resulted in a marketable product was evolved, then the cost should be charged to the product and not overhead charges. It appeared to be the opinion that in the case of a factory making one product only, a comparatively simple scheme was possible, but in the case of a factory making a number of products and where some of the products were further developed in other departments, the system of costing became very complicated.

Ramsay Memorial Fellowships

Awards in Chemical Science

THE appointments to Ramsay Fellowships in Chemical Science for this session—British, Dominion and Foreign—are completed. At the present time seventeen fellowships are being held in the Universities and Colleges of the United Kingdom. The list of awards for the present session is as follows. In each case the university or college which has been selected by the Fellow for his research is given.

BRITISH FELLOWSHIPS.—Mr. George A. Elliott, B.Sc., University College, London; Mr. H. Raymond Ing, M.A., Ph.D., University of Oxford; Mr. S. W. Saunders, B.Sc., Ph.D., University College, London.

GLASGOW FELLOWSHIPS.—Mr. James D. Fulton, M.A., B.Sc. (since resigned); Mr. T. Corlett Mitchell, B.Sc., University of Cambridge.

CANADIAN FELLOWSHIP.—Mr. Donald McKay Morrison, B.A., M.Sc., Ph.D., University of Cambridge.

DANISH FELLOWSHIP.—Mr. Kai J. Pedersen, University of Bristol.

DUTCH FELLOWSHIP.—Mr. W. G. Burgers, Royal Institution, London.

FRENCH FELLOWSHIP.—M. Marcel Mathieu, Royal Institution, London.

GREEK FELLOWSHIP.—Dr. N. Ekonomopoulos, University College, London.

ITALIAN FELLOWSHIP.—Dr. Paolo Misciattelli, University of Oxford.

JAPANESE FELLOWSHIP.—Dr. Seisi Takagi, University College, London.

NORWEGIAN FELLOWSHIP.—Mr. Leif Lindemann (appointed 1924–25), University of Sheffield; Mr. Karl Sandved, Imperial College of Science and Technology, London.

SPANISH FELLOWSHIP.—Senor Fernando Calvet, University of Oxford.

SWEDISH FELLOWSHIP.—Mr. Erik Rudberg, Lic.Phil. (appointed 1924–25), King's College, London; Mr. Gunnar Hagg (commencement of work deferred till October, 1926).

SWISS FELLOWSHIP.—(Vacant during 1925–26).

The total value of the annual amount of the fellowships that is awarded is approximately £4,600, of which about £3,100 is provided by grants from dominion and foreign sources.

Dr. C. Carpenter's Experience of Co-partnership

THE Municipal School of Commerce lecture at Birmingham University, on Monday, was on the subject of "Co-partnership and Profit-Sharing." The lecturer, Dr. Charles Carpenter, chairman of the South Metropolitan Gas Co., was unable to be present, but his manuscript was read to the meeting.

The paper sketched briefly the rise of industrialism and the gradual disappearance of the old personal association and intercourse of employers and workmen. His (Dr. Carpenter's) experience, extending over many years, had convinced him that the only solution of the problem lay in the application of co-partnership principles to industry. Simple profit-sharing was the payment of an annual bonus in cash. Generally it was spent as received, and instead of encouraging thrift did exactly the reverse. If the position of the wage-earners was to be improved, it was essential they should become owners of property, and for the majority of workmen profit-sharing was the only profitable way. The object of co-partnership was to give the employee a real and active interest in the business; whilst in profit-sharing, the only interest he had was a cash one. Any scheme must contain three vital principles:—(1) A share in profits; (2) a share in capital; and (3) a share in control and responsibility.

The Purification of Steam

IN view of all the recent advances made in steam generation it is not surprising that attention is now being concentrated on the purity of steam as it issues from the boiler. Ordinary saturated steam not only contains, under average conditions, 2 to 5 per cent. of free water particles carried over mechanically, but many other suspended impurities in addition, of which one typical product is particles of iron rust, chiefly from the pipe circuits.

Obviously it is important to have the steam as pure as possible, not only in connection with the operation of engines and turbines, but particularly also when the steam is blown direct into water or liquids generally, as in the chemical industries, other objectionable constituents being traces of oil and solidified scum from the water level in the boiler. Free moisture in steam also means a direct loss in the coal bill, since heat is taken out of the boiler otherwise than in the form of true gaseous steam, while the efficiency of the superheater is reduced.

A New Separator and Dryer

An indication, however, of better practice in this connection is a new separator and dryer which has been placed on the market by The Power Auxiliaries Co., Ltd., of Marsden Street, Manchester, consisting of an arrangement of light cast iron boxes, generally two in number, placed in the steam space attached to the outlet pipe in place of the ordinary anti-priming device, which incidentally is an obsolete contrivance. These boxes are closed except at the sides, which are constructed of several rows of narrow vertical gutter baffles, having a narrow slit between each, the design being such that the slits in one row are staggered relatively to the next. The result is that the steam is split up into a very large number of extremely narrow ribbons or streams, which are then given a rapid motion with a number of sharp turns at right angles, by means of which the heavier water particles and other impurities are left behind and the pure steam passes on, giving a complete elimination of all the solid products and reducing the free moisture content to less than 0.5 per cent. The separated impurities are passed out through the front of the boiler by means of a non-return pipe in the form of a brown mud, and the matter is of decided interest to every steam user, since any type of boiler can be fitted.

It may be stated in this connection that the determination of the amount of free moisture in steam is an extremely difficult matter, the readings always tending to be high. Also considerable precautions are necessary in taking an average sample of the steam.

Benzene Derivatives

BENZENE to-day is one of the most important of the foundation products of chemical industry, its innumerable compounds entering into almost every branch. Their use is enormously increasing, but, as with many other post-war developments, definite knowledge regarding their properties, synthesis, and uses has grown so rapidly that chemists and manufacturers have considerable difficulty in keeping abreast with it, and more especially in adapting it to practical requirements. In view of this position, *The Synthesis of Benzene Derivatives*, by S. C. Bate, B.Sc., F.I.C., has just been published (Ernest Benn, Ltd., 21s.).

The book breaks entirely new ground in the arrangement of facts and the classification of substances. The author takes the various classes of derivatives one by one and indicates concisely the principal methods by which all the known compounds can be prepared. It is, in fact, the first real attempt to deal comprehensively with the benzene compounds, and the book should be welcomed as a unique contribution to the literature of industrial chemistry.

British Laboratory Apparatus

IN addition to their catalogue of laboratory fittings, A. Gallenkamp and Co., Ltd., have issued two interesting lists of apparatus for special work: a catalogue of apparatus for cement testing, comprising sieves, calcimeters, testing machines for tensile strength, hydraulic presses for compression tests, etc.; and a pamphlet of paper and textile testing apparatus, such as strength testers, twist counters, thread counters, etc.

Former Arcos Manager Gains Libel Verdict

THE jury returned a verdict for the plaintiff, assessing the damages at £500, in an action in which Captain Vladimir Sagovsky, of 4, Addison Mansions, Kensington, W., claimed from Ben Searle and Co., of 23, Leadenhall Street, E.C., damages for alleged libel. Captain Sagovsky complained that while he was head of the coal department of Arcos, Ltd., the defendants wrote a letter to his employers suggesting that he had omitted to procure the best tenders for coal for his firm with a view to "feathering his own nest" and robbing his employers.

Captain Sagovsky, in evidence, said that he was dismissed by Arcos, Ltd., in January, 1925, and he then went on with the present action, which he had previously delayed at the request of his employers, who did not want their name to appear in connection with it. Politically he was not in sympathy with the Russian Trade Delegation. He had suffered through the revolution. His object in restarting the action was not to force Arcos, Ltd., to take him back; he did not wish to return to them.

Mr. Charles for the defence, said that after Arcos, Ltd., had received the alleged libel they not only retained Captain Sagovsky in their employment but they also doubled his salary. The sole reason for the action lay in the dismissal of Captain Sagovsky from the service of Arcos, Ltd.

Judgment was entered as stated, with costs.

Aniline Dyes for Foodstuffs

MR. ERNEST HICKSON, President of the Society of Dyers and Colourists, in the course of a letter to the Press, states that "charges of the alleged danger of aniline dyes made at the time of the Healthier Exhibition in 1884 were minutely investigated by the Society of Dyers and Colourists, who made elaborate inquiries not only in England but in many foreign countries. Their report made it quite plain that the allegations then made had no foundation in fact. Out of some 2,000 colours that are popularly styled "aniline colours" only a limited number are actually made from aniline, and though aniline oil is poisonous, the toxic effect disappears when it undergoes the processes necessary for converting it into dyes. All the countries which have looked into the matter have actually agreed that quite a large number are perfectly harmless and officially recognised as suitable for colouring foodstuffs. These include England, Australia, the United States of America, Germany and, I think, France."

New Cement Enterprise

SPEAKING at the statutory meeting of the Halborough Cement Co. in London on Monday, the chairman, Major W. L. H. Roberts, said that their issue in October was considerably over-subscribed. The property purchased contained raw materials acknowledged to be the finest in the country. Two kilns were working and the third would be ready by October. It was expected that the suggested output of 125,000 tons per annum would be fulfilled. He emphasised the excellent transport and disposal facilities at the Medway site. Far from experiencing any difficulty in disposal, said the speaker, they were at times only able to supply a fraction of demands. A progressive future was anticipated and all the estimates published in the prospectus were expected to be fulfilled or even exceeded.

Dyestuffs Licences for January

THE following statement relating to applications for licences under the Dyestuffs (Import Regulation) Act, 1920, made during January, has been furnished to the Board of Trade by the Dyestuffs Advisory Licensing Committee. The total number of applications received during the month was 581, of which 509 were from merchants or importers. To these should be added 24 cases outstanding on December 31, making a total for the month of 605. These were dealt with as follows: Granted, 475 (of which 442 were dealt with within seven days of receipt); referred to British makers of similar products, 96 (of which 73 were dealt with within seven days of receipt); referred to Reparation Supplies available, 16 (all dealt with within two days of receipt); outstanding on January 30, 1926, 18. Of the total of 605 applications received, 513, or 88 per cent., were dealt with within seven days of receipt.

From Week to Week

THE GERMAN VISTRA Co. are reported to be planning an English artificial wool factory to be run by a company with a capital of £1,000,000.

THE ENGAGEMENT IS ANNOUNCED between Mr. John Buckland, of Edgbaston, Birmingham, and Nora, youngest daughter of Sir Alfred and Lady Mond, of 35, Lowndes Square, London, and Romsey, Hants.

A FINE OF £50 was imposed on the Scottish Sugar Corporation, Ltd., of Colwick, on Saturday, January 30. They failed to protect an electric lamp at their beet sugar factory and a workman was killed last October.

A FIRE OCCURRED on Monday at the premises of Kemball, Bishop and Co., Ltd., chemical manufacturers, of Bromley, E., through a defect in a boiler. About 100 gallons of retort oil were destroyed, and an oil boiler was damaged.

FIFTY NEW SUGAR FACTORIES are to be erected in Russia according to plans of the Soviet Government. A delegation of the Russian Sacharotrust has visited Prague for the purpose of negotiating with Czechoslovakian manufacturers for the supply of sugar factory plant and equipment.

FOR ATTEMPTING TO DIVULGE SECRET PROCESSES of the Höchst Farbwerke in connection with ammonia production to a firm abroad two German chemical students have been heavily fined and sentenced to six months' and four months' imprisonment respectively at Höchst-am-Main.

THE SANKLEY SUGAR CO., LTD., of Earlestown, Lancashire, has ceased to be a member of the British Sugar Refiners' Association, because the Dutch Van Rossum group have acquired a majority of the shares. The Van Rossum group are prominent importers of foreign sugar into this country, and are important competitors of British refiners.

DR. E. W. WASHBURN, Urbana, Ill., has been appointed chief of the Chemical Division, Bureau of Standards, U.S. Department of Commerce, to succeed the late Dr. W. T. Hillebrand. Dr. Washburn brings to his new position a thorough knowledge of chemistry and allied subjects and a wide acquaintance in the field of chemical research, on which subject he has written extensively.

DR. G. C. CLAYTON, M.P. for Widnes, and a director of the United Alkali Co., speaking to his constituents on Friday, January 29, said that there could be no doubt our industries had a much brighter aspect than they had had since the war. He was satisfied that the corner had been turned, but all depended upon peace at home. Without that we could never regain lost trade.

MR. W. J. U. WOOLCOCK addressed Bristol Rotary Club on Monday on "Some Fine Chemicals." He said that the prejudice against British chemicals was being removed, and those engaged in the industry were determined to maintain it and to preserve the results of such discoveries as had been made for the benefit of this country. Our exports of fine chemicals were now more than twice as much as pre-war rates.

THE ADVANTAGES TO BE GAINED by the foundation of a National Institute of Industrial Micro-biology were dealt with by Mr. A. Chaston Chapman at a meeting of the British Mycological Society in London on Saturday, January 23. A resolution (proposed by Mr. F. T. Brooks, the University, Cambridge, and seconded by Professor Dame H. Gwynne-Vaughan) was carried unanimously to the effect that the members of the Society thought it most desirable that a National Institute of Micro-biology should be established in this country.

RESEARCH IN AGRICULTURAL SCIENCE at Rothamsted was the subject of a paper read by Sir John Russell, Director of Rothamsted Experimental Station, at a meeting of the Royal Society of Arts on Wednesday. Sir John outlined the history of the experiments started by J. B. Lawes 33 years ago, and mentioned that before his death Lawes set up a trust which he endowed with £100,000 to carry on the work in perpetuity. The purpose of the work had always been to obtain knowledge of plants and soils, rather than to show farmers how to obtain more money. The work had expanded, and it was now carried on by a staff of 40 scientific workers and an equal number of assistants.

CHEMISTRY IN EVERYDAY LIFE was the subject of the first of a series of four lectures by Professor A. W. Stewart, D.Sc., at Belfast on Thursday, January 28, under the auspices of the Workers' Educational Association. He dealt with the place of carbon dioxide in Nature, and gave illustrations of its common uses. Experiments were shown to illustrate the properties of the gas. The problem of "hard" and "soft" waters was dealt with, and the formation of boiler-scale, and the growth of stalactites and stalagmites were shown to be connected with the presence of carbon dioxide in solution. The lecturer gave an account of Professor Baly's recent work in synthesising sugars from carbon dioxide by means of the ultra-violet ray of the mercury lamp. The production of cellulose from carbon dioxide by plants was referred to, and the conversion of cellulose into artificial silk was shown on a small scale.

THE RESUMED CONFERENCE ON "Smokeless Fuel," arranged by the Chemical Engineering Group for January 19 in Manchester, has been postponed to a later date not yet fixed.

A LECTURE ON "The Crystal Structure of Oxalic Acid and Certain Oxalates" was delivered at Armstrong College, Newcastle, on Monday by Mr. J. F. Wood, M.Sc., lecturer in physics.

MR. J. S. PHILLIPS, sales manager of Crow, Catchpole and Co., Ltd., Aldwych House, Aldwych, tar distillers and tarmacadam manufacturers, has been appointed a director of Bassetts, Ltd., tarmacadam manufacturers, Stoke-on-Trent.

PROPAGANDA METHODS are demonstrated by the announcement that Mr. S. G. Turrell, A.A.C.I., consulting metallurgist, of Kalgoolie, has been appointed by the American Cyanamid Co. to demonstrate their various nitrogenous products in the Far East.

LEAFLETS DESCRIPTIVE of oil and water meters and recording instruments of various kinds—three pen recording distance thermometers, indicating thermometers, circular recorders, etc.—have been received from the Sarco Engineering and Trading Co., Ltd., of 36 and 38, Kingsway, W.C.2.

MR. J. Y. BUCHANAN, F.R.S., who died in October, 1925, left £166,854. He was a noted chemist and mineralogist and was chemist and physicist on the "Challenger" expedition in 1872. Other recent wills include:—Mr. B. Kostoris, head of B. M. D. and L. Kostoris, calico printers, Manchester, £188,346 (net personalty, £182,051).

A GENERAL MEETING of the members of the Royal Institution was held on Monday, with Dr. E. Clarke in the chair. The special thanks of members were returned for an anonymous donation of £500 to the Research Fund. Mr. H. J. Heckle, Dr. G. W. C. Kaye, Mrs. Shaw Stewart, Mr. R. M. Weston and Mr. H. J. Yates were elected members.

DR. G. A. COWIE, chief agricultural adviser to the Potash Syndicate (Great Britain), sends us the Syndicate's handy pocket diary, which, in addition to the usual features, includes useful fertilising notes, tables of analysis and results of official experiments.—Hensman Brothers, Horncastle, manufacturers of "Kamforite," send us a particularly well produced wall calendar.

MR. J. LESLIE FAIRRIE, at a lecture on "The Production and Refining of Cane Sugar," arranged by a branch of the Leeds Industrial Co-operative Society, described a distinctive process of removing undissolved impurities, in which the percolation of the sugar liquor through bone charcoal was emphasised. The charcoal had the effect of decolourising, purifying, and sterilising the sugar. Not all British-grown sugar was subjected to that treatment, some being bleached instead.

UNIVERSITY NEWS includes the following announcements:—*Edinburgh*: Sir John Russell has been appointed an external examiner for the degree of D.Sc.—*Durham*: Armstrong College, Newcastle. Dr. T. Iredale has been appointed Lecturer in Chemistry in the place of Dr. V. G. Jolly, who resigned to take up an industrial post. Dr. Iredale is an Australian and a graduate of Sydney and London. Since 1921 he has been carrying out research and demonstrating in chemistry at University College, London.

A FATAL EXPLOSION occurred at the celluloid factory of the British Xylonite Co., Hale End, on Friday, January 29. Two employees of Aiden and Co., Derby, who were working there, died from injuries received. At the inquest on Tuesday it was shown that the boiler exploded and one of the tubes had withdrawn from the "header." The tube was stopped up, presumably by scales, and the hearing was adjourned until Monday for further inquiry.—When opening a tin of calcium carbide it exploded and an employee of Stewarts and Lloyds was injured on Friday, January 29.

A POSTHUMOUS AWARD of the Cross of the Legion of Honour has been made to André Ribaud, a 26-year old chemist who, "engaged in delicate and important researches concerning the extraction of rare gases from the air, lost his life in one of those mysterious accidents which so often occur to those engaged in research work." Ribaud, a graduate from the School of Physics, had been engaged for two years as collaborator of M. Georges Claude. At the time of the accident he was experimenting in extraction of such rare gases as xenon and krypton from the air. He was standing by a retort in which the residues from the evaporation of liquid air were being distilled when there was an explosion so violent that both his legs were torn off, and he died three hours later. M. Claude has pointed out that this case ought to stimulate the support of scientific research work, for Ribaud knew well enough the risk he was running, though the most dangerous point of the experiment had not been reached.

Obituary

MR W. P. HARRIS, director of Joseph Crosfield and Sons, soap manufacturers, Warrington, aged 47.

DR. KARL GOLDSCHMIDT, on January 5, aged 69. He was prominently connected with the Th. Goldschmidt Aktien-Gesellschaft, which carried on the Thermit processes for welding and for the preparation of chromium and magnesium. This process was worked out by Dr. Goldschmidt's brother, Hans.

References to Current Literature

British

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Patent Literature

The following information is prepared from published Patent Specifications and from the Illustrated Official Journal (Patents) by permission of the Controller to H.M. Stationery Office. Printed copies of full Patent Specifications accepted may be obtained from the Patent Office, 25, Southampton Buildings, London, W.C.2, at 1s. each

Abstracts of Complete Specifications

- 245,190. CARBONISATION OF FUEL, APPARATUS FOR. S. R. Illingworth, Brynffedwen, Radyr, Glamorganshire, The Illingworth Carbonisation Co., Ltd., 16, Kennedy Street, Manchester, Robert Dempster and Sons, Ltd., Elland, Yorks, and H. J. Toogood, The Poplars, Elland, Yorks. Application date, September 25, 1924.

This apparatus is particularly for the manufacture of shaped fuel by the carbonisation of coal. The retorts are composed of a nest of cast iron tubes which are formed in one piece, or in two pieces bolted together, or of plates of H section. The breadth of the tubes is 2—7 in. with a taper of not less than $\frac{1}{10}$ of an inch per foot. The metal retorts are enclosed by horizontal fireclay tubes one above the other, there being one set of tubes on the outside and two sets between the nests of retorts. The retort tubes and the refractory tubes are separate units which can be replaced when required. A cooling chamber is arranged below the retorts, and the apparatus may be combined with a producer to supply the heating gas, and with a regenerator to heat the air supply.

- 245,177. CONCENTRATING OR COAGULATING RUBBER EMULSIONS, METHOD OF. The Anode Rubber Co., Ltd., 15, Throgmorton Avenue, London, E.C.2. From P. Klein and A. Szegvari, V. Vilmos-Csaszar-ut 78, Budapest. Application date, July 31, 1924.

When rubber latex is subjected to the action of an electric current the rubber particles move towards the anode, and in this invention partitions are inserted between the cathode and the anode, which are impermeable, semi-permeable, or permeable to liquids according to the effect desired. In one example (Fig. 1), anodes *a* are embedded in moulds *z* of gypsum, and a horizontal cathode *k* is arranged at the bottom of the vessel *c* containing the rubber latex. Impermeable cup-shaped partitions *b*, e.g., of glass, are arranged between the cathode and the moulds *z*.

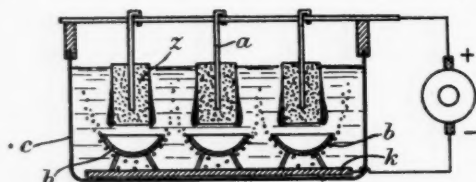


Fig. 1.

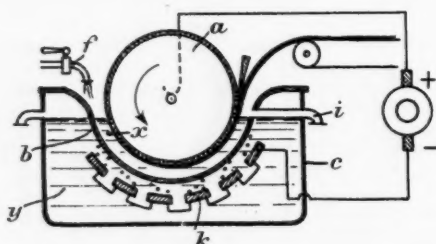


Fig. 3.

This causes the rubber to be deposited on the moulds *z* as a homogeneous skin mainly on the circumference of the moulds. The partitions *b* prevent deposition of the rubber on the bottom of the moulds, and prevent liberated gas bubbles from reaching the rubber and thus affecting its homogeneity. The partitions *b* may be porous if it is desired to prevent their electric screening effect. In a modification for impregnating fabrics, the anode may consist of an endless band moving parallel to the cathode, while the permeable partition may be an endless band of fabric of sufficiently small mesh to prevent the passage of bubbles. The fabric to be coated is

caused to pass through the latex together with the anode *a*, and the rubber is deposited on it.

In another modification (Fig. 2), vessel *c* is divided into two chambers *x*, *y*, by a diaphragm *b* of unglazed clay, and the anode *a* consists of a rotating drum which may have a coating of gypsum. The cathode *k* is arranged in the compartment *y* opposite to the drum *a*. The rubber latex passes through the chamber *x* from the inlet *f* to the outlet *i*, and the chamber *y* contains an electrolyte. The rubber is collected on the drum *a* as a coagulated skin or a non-coagulated concentrate. If the permeable diaphragm contains a 0.5 per cent. ammonia solution, and if the latex has been preserved with 0.5 per cent. ammonia and contains antimony pentasulphide, no deposition of rubber will take place if a current density of 0.05 ampere per square decimetre is employed. The rubber then collects in the form of a concentrate, but if a higher current density is employed, a deposit is produced.

- 245,287. AZO-DYESTUFFS, MANUFACTURE OF. O. Y. Imray, London. From Farbwerke vorm. Meister, Lucius and Brüning, Hoechst-on-Main, Germany. Application date, January 24, 1925.

These dyestuffs are obtained by combining an arylide of 2-oxynaphthalene 3-carboxylic acid with a diazo compound of one of the benzaldehyde azo- α -naphthylamines; the latter are obtained by coupling a diazotised amino-benzaldehyde with an α -naphthylamine capable of being coupled in 4-position. These dyestuffs are chiefly black and are of a good fastness. The dyes may be produced on the fibre by impregnating it with the arylide of 2-oxynaphthalene 3-carboxylic acid and treating with a diazo compound of the benzaldehyde-azo- α -naphthylamine. The fastness to light may be increased by treatment with a copper salt. Several examples of the production of these dyestuffs in substance and on the fibre are given.

- 245,352. PERMANENT EMULSIONS, MANUFACTURE OF. Soc. of Chemical Industry in Basle, Switzerland. Application date, June 11, 1925. Addition to 200,036.

Specification No. 200,036 describes the production of permanent emulsions of medicaments soluble in oil by using a partly halogenated oil such that the oily phase has the same specific gravity as the aqueous phase. It has now been found that this process can be applied generally for the manufacture of permanent emulsions by emulsifying oils which have been partly halogenated so as to have the same specific gravity as that of the aqueous phase. Thus castor oil may be treated with chlorine until about 10 per cent. of its weight has been absorbed, and the specific gravity is 1.02. This oil may be emulsified with a solution of gum of the same specific gravity. The requisite specific gravity of the halogenated oil may also be obtained by adding other materials which are miscible with oils, e.g., commercial oil^s, tar oil, paraffin oil, etc.

NOTE.—Abstracts of the following specifications which are now accepted, appeared in THE CHEMICAL AGE when they became open to inspection under the International Convention: 222,481 (T. T. Gray), relating to purification of hydrocarbons, see Vol. XI, p. 560; 228,103 (F. Wüst), relating to production of tin from alloys containing iron, see Vol. XII, p. 31 (Metallurgical Section); 231,455 (Soc. of Chemical Industry in Basle), relating to dyeing of acetyl cellulose, see Vol. XII, p. 564; 232,263 (H. Pereira), relating to manufacture of vat dyes, see Vol. XII, p. 617; 237,573 (Ketoid Co.), relating to manufacture of keten, see Vol. XIII, p. 334; 237,615-6 (A. F. Meyerhofer), relating to production of complex salts of hydrofluoric acids, see Vol. XIII, p. 358.

International Specifications not yet Accepted

- 243,665. COKING PROCESSES. Soc. l'Air Liquide, Soc. Anon. pour l'Etude et l'Exploitation des Procédés G. Claude, 48, Rue St. Lazare, Paris. International Convention date, November 28, 1924.

At the end of the distillation of coal or lignite the atmosphere (Continued on page 137)

(Continued from page 136)

sphere in the retort is displaced by nitrogen, air, or combustion products, so that hydrogen and methane which are usually retained in the coke have a small partial pressure and are therefore liberated. The gases obtained may be partly liquefied to obtain hydrogen and nitrogen.

243,677. SODIUM BICARBONATE. Ges. für Kohlentechnik 26, Deutschesstrasse, Eving, Dortmund, Germany. International Convention date, November 26, 1924. Addition to 229,640.

Specification No. 229,640 (see THE CHEMICAL AGE, Vol. XII, p. 462) describes a modified ammonia-soda process in which ammonium chloride and sodium bicarbonate are precipitated alternately from a liquor which contains some other ammonium or sodium salt which is more soluble than sodium bicarbonate. In this invention, the more soluble salt may be sodium or ammonium thiocyanate, or the crude thiocyanates obtained in gas purification processes which also contain thiosulphates, sulphates, polysulphates and polysulphides. Thus solid ammonium bicarbonate is added to the saturated solution of sodium and ammonium chlorides containing ammonium thiocyanate. Sodium bicarbonate is precipitated and separated, and the equivalent quantity of sodium chloride added. Ammonium chloride precipitates on cooling, and the remaining liquor is then used again.

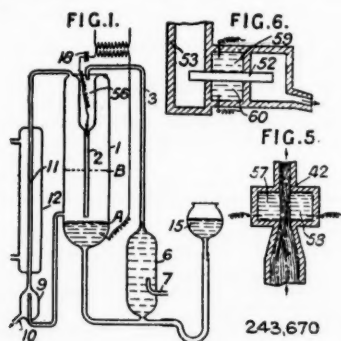
243,737-8. DYEING CELLULOSE ESTERS AND ETHERS. Farbwerke vorm. Meister, Lucius, and Brüning, Hoechst-on-Main, Germany. International Convention date, November 25, 1924.

243,737. The dyes employed are basic monoazo dye-stuffs containing a sulphamino group in the diazo component. Thus a dye bath for cellulose acetate contains the hydrochloride of the dyestuff 4-aminobenzene-1-sulphamide → aminocresol ether. Ammonium acetate is added during the dyeing, and a yellow shade is obtained. Other examples are 2-nitraniline 4-sulphamide → *m*-toluidine and 4-aminobenzene 1-sulphamide → α -naphthylamine.

243,738. These dyes are monoazo dyestuffs obtained from an unsulphonated aromatic diazo compound of the benzene or naphthalene series containing at least one nitro group and diethyl-aniline-*m*-sulphonic acid. Dyestuffs for cellulose acetate include 3-nitro-2-methyl-1-aminobenzene → diethylaniline-*m*-sulphonic acid, and those from diazotised 4-chloro-2-nitraniline-3-nitraniline-6-carboxylic acid ester and 2:4-dinitraniline.

243,670. TREATING MERCURY TO OBTAIN OTHER ELEMENTS. Siemens and Halske Akt.-Ges. Siemensstadt, Berlin. International Convention date, November 28, 1924.

In this invention mercury is subjected to an electric treatment which converts it into gold. A vessel 1 contains mercury to the level A, and a liquid dielectric up to the level B. The mercury is circulated by an air jet 7 through the vessel 6 and tube 3, and the dielectric is similarly circulated by an air jet 10 through a tube 11 cooled by a jacket 12. A tube 2



is immersed in the dielectric to such a point that as a drop of mercury emerges from it a spark may be passed into the mercury in the tube 1 by means of an applied potential difference of 100-150,000 volts. The dielectric may be paraffin or other oil, ether, or carbon tetrachloride. In a modification a sheet of liquid dielectric 42 may be passed through a quantity of mercury to divide it into two portions

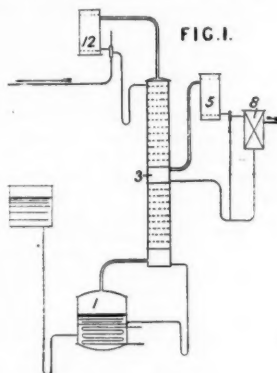
57, 58, between which sparks are passed. In another modification, a mass of mercury is divided into two portions 59, 60 by a porous plate 52 saturated by liquid dielectric from a chamber 53.

243,739. DYES. Soc. of Chemical Industry in Basle, Switzerland. International Convention date, November 28, 1924. Addition to 199,360.

In Specification No. 199,360 (see THE CHEMICAL AGE, Vol. IX, p. 211) the indophenol from carbazol and *p*-nitrosophenol is sulphurised in the presence of benzidine. In this invention, the benzidine is replaced by a derivative, or another organic base or derivative, or a substance yielding these, such as aniline, toluidines, chloranilines, phenylenediamines, naphthylamines, nitro-compounds such as *p*-nitraniline, acetanilide, acetyl-*o*-toluidine, acetyl-*p*-phenylene diamine, and diacetyl-benzidine. In an example, the indophenol is reduced by stirring with sodium sulphide, dried and heated to 170°-180° C. with aniline, sulphur, and salt, yielding a product which gives blue shades on cotton.

243,736. ETHERS. Distilleries des Deux-Sèvres, Melle, Deux Sèvres, France. International Convention date, November 26, 1924.

In a continuous process for preparing ethers, the water formed by the reaction of sulphuric acid and alcohols is



243,736

removed by adding gasoline or benzene which forms an azeotropic mixture with water, and distilling. The mixture is heated in a boiler 1 and the vapour passes into a rectifying column 3 from which the ether passes to a condenser 5. A condenser 5 and dehydrating apparatus 8 are connected to the column 3.

243,758. INTERMEDIATE PRODUCTS AND DYES. Farbwerke vorm. Meister, Lucius, and Brüning, Hoechst-on-Main, Germany. International Convention date, November 27, 1924.

1-sulphoaryl-5-pyrazolone-3-carboxylic alkyl esters such as 1-(4¹-sulphophenyl)-5-pyrazolone-3-carboxylic acid ethyl and methyl esters, and 1-(2¹-methyl-6¹-chloro-4¹-sulphophenyl)-5-pyrazolone-3-carboxylic acid ethyl esters are made from the hydrazones from sulphonylhydrazine sulphonic acids and oxaloacetic esters by heating in aqueous solution or by standing in cold alkaline aqueous solution.

These pyrazolones are coupled with diazo compounds to obtain azo dyes, or they may be obtained by esterifying the dyestuffs from diazo compounds and 1-sulphoaryl-5-pyrazolone-3-carboxylic acids. Suitable diazo components include *o*-, *m*-, or *p*-toluidine, *m*-, or *p*-chloraniline, chlortoluidines, xylydines, *o*-, *m*-, or *p*-aminobenzoic methyl or ethyl ester, nitroaminobenzoic ester, *m*-aminobenzoic anilide, *m*-aminoanisic anilide, *o*-aminophenol and its substitution products, aniline sulphonic acids and their homologues and substitution products such as *o*-aniline sulphonic acid, metanilic acid, chlor- and nitro-aniline sulphonic acids, toluidine and xylylidine sulphonic acids, mono- and diaminotriphenyl-methane, di-amino-phenyl-dimethyl-methane, di-*o*-tolyl-dimethyl-methane, 2:2¹-toluidine, 2:2¹-dichlorbenzidine, diamino-diphenylamine. Dyestuffs are described from *m*-amino-benzaldehyde, *o*-chloraniline, sulphanilic acid, 5-nitro-2-aminobenzoic acid, or picramic acid and 1-(4¹-sulphophenyl)-5-pyrazolone-3-car-

boxylic ethyl ester, and also aniline or 6-chloraniline-3-sulphonic acid and 1-(2-methyl-6-chloro-4-sulphophenyl)-5-pyrazolone-3-carboxylic ethyl ester.

243,766. **SYNTHETIC DRUGS.** Farbenfabriken vorm. F. Bayer and Co., Leverkusen, near Cologne, Germany. International Convention date, December 1, 1924.

The reaction between an *o*-phenylene-diamine and an alkyl- or aryl etheracid in the manner known for the production of benzimidazole derivatives yields 2-alkyl- or aryl-alkyl-benzimidazoles. An alternative method is the reduction of the corresponding *o*-nitroacylamino-benzenes to effect simultaneous reduction and ring closure. In an example, 2-ethoxymethyl-benzimidazole is obtained by heating *o*-phenylene-diamine with ethoxyacetic anhydride at 120° C., separating the diacyl compound, and heating it dry at 180° C. Other compounds described are 5-ethoxy-2-ethoxymethyl-benzimidazole hydrochloride, 2 phenoxy-methyl-benzimidazole, and 5-ethoxy-2-phenoxy-methyl-benzimidazole.

244,076. **METHANE.** Chemische Fabrik Griesheim Elektron, 31, Gutleutstrasse, Frankfurt-on-Main, Germany. International Convention date, December 3, 1924.

Carbon monoxide and hydrogen-containing gases are passed over a nickel catalyst at 400° C. or above, the rate of flow being adjusted to secure rapid removal of the gases from the reaction zone. Methane is obtained.

LATEST NOTIFICATIONS.

246,430. Manufacture of solutions of cellulose derivatives. Soc. pour la Fabrication de la Soie Rhodiaseta. January 20, 1925.

246,447. Manufacture of finely-subdivided pigment dyes, and the application thereof. Farbwerke vorm. Meister, Lucius, and Brüning. January 22, 1925.

246,476. Manufacture of a new derivative of cellulose. Ogden, S. A. January 20, 1925.

246,480. Manufacture of refractory articles of pure oxide of zirconium. Deutsche Gasglühlicht-Aueres. January 23, 1925.

246,482. Manufacture of new derivatives of naphthoquinones. Soc. Anon. des Matières Colorantes et Produits Chimiques de Saint-Denis, Lantz, R., and Wahl, A. January 21, 1925.

246,501. Process for iodising pyridine derivatives. Deutsche Gold- und Silberscheideanstalt vorm. Roessler. January 24, 1925.

246,512. Method of manufacturing alumina salts from alumina silicate and alumina containing minerals. Lederer, O., and Stanczak, Dr. W. January 24, 1925.

246,526. Process of esterification. U.S. Industrial Alcohol Co., January 26, 1925.

Specifications Accepted with Date of Application

227,839. Chemically pure sulphuric acid, Manufacture of. Soc. Anon. de Produits Chimiques de Droogenbosch. January 19, 1924.

231,458. Catalysts, Method of using. Benzonaftene. March 26, 1924.

231,866. Water gas, Manufacture of. Humphreys and Glasgow, Ltd. April 3, 1924.

232,986. Gaseous mixture of any kind, Process for the separation of the several components of. G. L. E. Patart. April 26, 1924.

240,412. Oxygen, Manufacture of. Soc. l'Oxylythe. September 25, 1924.

241,903. Phosphoric acid, Process for the production of. Chemische Fabrik Griesheim Elektron. October 23, 1924.

245,587. Dyes and dyeing. J. I. M. Jones, B. Wylam, J. Morton, and Morton Sundour Fabrics, Ltd. July 12, 1924.

245,856. Gaseous mixtures, Separation of vaporised organic substances from. J. J. V. Armstrong. (Naamloose Vennootschap Algemeene Chemische Productenhandel.) September 21, 1925.

245,860. Hydrocarbon gas mixtures, Processes for the recovery of readily liquefiable constituents from. E. C. R. Marks. (Carbide and Carbon Chemicals Corporation.) October 18, 1924.

245,866. Cement, Manufacture of—and kilns for use therein. S. W. Burley. October 22, 1924.

245,867. Acid-proof and like containers. A. Kelly. October 23, 1924.

245,903. Sulphuric acid, Process for the manufacture of. W. Carpmel. (Farbenfabriken vorm. F. Bayer and Co.) December 5, 1924.

245,912. Treatment of liquids, gases, or solutions with active carbon. H. E. Potts. (Naamloose Vennootschap Algemeene Norit Maatschappij.) February 22, 1924.

245,991. Chlor-derivatives of methane, Production of. H. Wade. (S. Karpen and Bros.) April 27, 1925.

246,000. Drying bleaching powder. J. T. Conroy, A. Lambie, J. J. Latham, and United Alkali Co., Ltd. May 15, 1925.

246,046. Separating suspended particles from flowing gases or vapours, Process of. Lodge Cottrell, Ltd. (Lurgi Apparatebau-Ges.) August 6, 1925.

245,865. New intermediate compounds and azo dyestuffs, Manufacture of. British Dyestuffs Corporation, Ltd., and K. H. Saunders. October 21, 1924.

Applications for Patents

Alliott, E. A., Manlove, Alliott and Co., Ltd., and Philps, A. M. Filter presses. 2,215. January 26.

Arthur, J. S., and Commercial Alcohol Co., Ltd. Production of cellulose solutions. 2,695. January 29.

Audibert, E. Preparation and utilisation of a catalysing substance. 2,768. January 30.

Baraboschkin, N., and Trust Uralkupfer. Extraction of precious metals from slimes of copper refineries. 2,289. January 26.

Bloxam, A. G., and I. G. Farbenindustrie Akt.-Ges. Manufacture of diazo preparations. 2,143. January 25.

Bloxam, A. G., and I. G. Farbenindustrie Akt.-Ges. Manufacture of oxynaphthalene carboxylic acid. 2,565. January 28.

British Dyestuffs Corporation, Ltd., and Bunbury, H. M. Mono-oxamic acids of diaminoanthraquinones. 2,398. January 27. (December 19, 1924.)

Brown, H. T. Liquefaction of coal. 2,377. January 27.

Burmah Oil Co., Ltd. Treatment of mineral oil distillates. 2,362. January 27.

Burmah Oil Co., Ltd., and Fraser. Process for refining mineral oils, etc. 2,075. January 25.

Carmichael, J. F., and Carmichael and Co., Ltd., J. F. Distillation of tar, etc. 2,342. January 27.

Carmichael, W., and I. G. Farbenindustrie Akt.-Ges. Manufacture of new monoazo dyestuffs. 2,756. January 30.

Esseff Chemische Industrie-u. Handels Akt.-Ges. Manufacture of alkaline earth salts. 2,759. January 30. (Austria, February 25, 1925.)

Fabrick van Chemische Producten and Kraus, E. Manufacture of sulphurised derivatives of phenols. 2,258. January 26.

Fabrick van Chemische Producten and Kraus, E. Manufacture of sulphurised derivatives of naphthols. 2,259. January 26.

Fielding, Sir C. W. Manufacture of sulphuric acid. 2,666. January 29.

Fielding, Sir C. W. Manufacture of sulphuric acid. 2,667. January 29.

Flor, K., Lichtenberger, T., and Salzwirk Heilbronn Akt.-Ges. Process for obtaining sulphur from alkaline sulphates. 2,677. January 29. (Germany, May 8, 1925.)

Heberlein, K. B. Treatment of cellulosic material. 2,439. January 27.

Holter, K., and Thune, S. Process for separating oil from solids. 2,301. January 26. (Norway, September 13, 1924.)

I. G. Farbenindustrie Akt.-Ges. Manufacture of new monoazo dyestuffs. 2,756. January 30.

I. G. Farbenindustrie Akt.-Ges. Manufacture of new alanines of the anthraquinone series, etc. 2,286. January 26. (Germany, January 31, 1925.)

I. G. Farbenindustrie Akt.-Ges. Manufacture of dry diazo-preparations. 2,774. January 30. (Germany, January 30, 1925.)

Kirby, W. Refining benzole. 2,775. January 30.

Mond, A. L., and Thalhoffer, W. Protection of metallic surfaces against corrosion. 2,438. January 27.

Patart, G. Utilisation of methane, etc. 2,559. January 28. (France, February 7, 1925.)

Patart, G. Synthetic production of higher alcohols. 2,560. January 28. (France, February 7, 1925.)

Patart, G. Simultaneous manufacture of methyl alcohol and liquid hydrocarbons. 2,561. January 28. (France, February 7, 1925.)

Patart, G. Simultaneous manufacture of methyl alcohol and liquid hydrocarbons. 2,562. January 28. (France, February 23, 1925.)

Powling, W. T. Recovery of fats, etc. 2,652. January 29.

Pozniakow, N. Process for rendering gelatin insoluble, etc. 2,155. January 25. (France, January 26, 1925.)

Räth, C. Production of 2 amino 5 iodopyridine. 2,306. January 26. (Germany, February 2, 1925.)

Robinson, R. Mono-oxamic acids of diamino-anthraquinones. 2,398. January 27. (December 19, 1924.)

Rustproof Processes, Ltd., and Thornton, M. Sherardising apparatus. 2,192. January 25.

Scottish Dyes, Ltd., Smith, W., and Thomas, J. Dyes and dyeing. 2,291. January 26.

South Metropolitan Gas Co. Refining benzole. 2,775. January 30.

U.S. Industrial Alcohol Co. Process of esterification. 2,300. January 26. (United States, January 26, 1925.)

Worsley, R. R. Le G. Treatment of mineral oil distillates. 2,362. January 27.

Weekly Prices of British Chemical Products

The prices and comments given below respecting British chemical products are based on direct information supplied by the British manufacturers concerned. Unless otherwise qualified, the figures quoted apply to fair quantities, net and naked at makers' works.

General Heavy Chemicals

ACID ACETIC, 40% TECH.—£19 per ton.
 ACID BORIC, COMMERCIAL.—Crystal, £37 per ton, Powder, £39 per ton.
 ACID HYDROCHLORIC.—3s. 9d. to 6s. per carboy d/d, according to purity, strength, and locality.
 ACID NITRIC, 80° Tw.—£21 10s. to £27 per ton, makers' works, according to district and quality.
 ACID SULPHURIC.—Average National prices f.o.r. makers' works, with slight variations up and down owing to local considerations; 140° Tw., Crude Acid, 60s. per ton. 168° Tw., Arsenical, £5 10s. per ton. 168° Tw., Non-arsenical, £6 15s. per ton.
 AMMONIA ALKALI.—£6 15s. per ton f.o.r. Special terms for contracts.
 BISULPHITE OF LIME.—£7 10s. per ton, packages extra, returnable.
 BLEACHING POWDER.—Spot, £9 10s. d/d; Contract, £8 10s. d/d, 4-ton lots.
 BORAX, COMMERCIAL.—Crystal, £25 per ton. Powder, £26 per ton. (Packed in 2-cwt. bags, carriage paid any station in Great Britain.)
 CALCIUM CHLORATE (SOLID).—£5 12s. 6d. to £5 17s. 6d. per ton d/d, carr. paid.
 COPPER SULPHATE.—£25 to £25 10s. per ton.
 METHYLATED SPIRIT 64 O.P.—Industrial, 2s. 5d. to 2s. 11d. per gall. Mineralised, 3s. 8d. to 4s. per gall., in each case according to quantity.
 NICKEL SULPHATE.—£38 per ton d/d.
 NICKEL AMMONIA SULPHATE.—£38 per ton d/d.
 POTASH CAUSTIC.—£30 to £33 per ton.
 POTASSIUM BICHROMATE.—4½d. per lb.
 POTASSIUM CHLORATE.—3½d. per lb., ex wharf, London, in cwt. kegs.
 SALAMONNIAC.—£45 to £50 per ton d/d. Chloride of ammonia, £37 to £45 per ton, carr. paid.
 SALT CAKE.—£3 15s. to £4 per ton d/d. In bulk.
 SODA CAUSTIC, SOLID.—Spot lots delivered, £15 2s. 6d. to £18 per ton, according to strength; 20s. less for contracts.
 SODA CRYSTALS.—£5 to £5 5s. per ton ex railway depots or ports.
 SODIUM ACETATE 97/98%.—£21 per ton.
 SODIUM BICARBONATE.—£10 10s. per ton, carr. paid.
 SODIUM BICHROMATE.—3½d. per lb.
 SODIUM BISULPHITE POWDER 60/62%.—£17 per ton for home market, 1-cwt. iron drums included.
 SODIUM CHLORATE.—3d. per lb.
 SODIUM NITRITE, 100% BASIS.—£27 per ton d/d.
 SODIUM PHOSPHATE.—£14 per ton, f.o.r. London, casks free.
 SODIUM SULPHATE (GLAUBER SALTS).—£3 12s. 6d. per ton.
 SODIUM SULPHIDE CONC. SOLID, 60/65.—£13 5s. per ton d/d. Contract, £13. Carr. paid.
 SODIUM SULPHIDE CRYSTALS.—Spot, £8 12s. 6d. per ton d/d. Contract, £8 10s. Carr. paid.
 SODIUM SULPHITE, PEA CRYSTALS.—£14 per ton f.o.r. London, 1-cwt. kegs included.

Coal Tar Products

ACID CARBOLIC CRYSTALS.—4½d. to 5½d. per lb. Crude 60's, 1s. 3d. to 1s. 6d. Better demand.
 ACID CRESYLIC 97/99.—1s. to 1s. 10d. per gall. 2s. paid in South. Pale, 95%, 1s. 6d. to 1s. 8d. per gall. Dark, 1s. 3d. to 1s. 6d. per gall. Good demand.
 ANTHRACENE.—A quality, 3d. to 4d. per unit; Paste 40%, 3d. per unit per cwt. Nominal price.
 ANTHRACENE OIL, STRAINED.—7d. to 8d. per gall. Unstrained, 6½d. to 7½d. per gall.
 BENZOL.—Crude 65's, 1s. 2½d. to 1s. 3½d. per gall., ex works in tank wagons. Standard Motor, 1s. 8d. to 1s. 10d. per gall., ex works in tank wagons. Pure, 1s. 11d. to 2s. per gall., ex works in tank wagons.
 TOLUOL.—90%, 1s. 8d. to 1s. 10½d. per gall. Pure, 1s. 11d. to 2s. 2d. per gall.
 XYLOL COMMERCIAL.—2s. to 2s. 6d. per gall. Pure, 3s. 3d. per gall.
 CREOSOTE.—Cresylic, 20/24%, 9d. to 10d. per gall. Market very quiet. Standard specification, 6½d. to 7d. per gall.; middle oil, heavy, 6½d. to 7½d. per gall. Export prices slightly higher.
 NAPHTHA.—Crude, 9d. to 1s. per gall. Solvent 90/160, 1s. 6d. to 1s. 8d. per gall. 2s. paid in South. Steady demand. Solvent 90/190, 1s. to 1s. 2d. per gall.
 NAPHTHALENE CRUDE.—Drained Creosote Salts, £3 10s. to £5 15s. per ton. Whizzed or hot pressed, £5 10s. to £7 10s.
 NAPHTHALENE.—Crystals and Flaked, £11 10s. to £13 per ton, according to districts.
 PITCH.—Medium soft, 57s. 6d. to 62s. 6d. per ton, according to district. Market active.
 PYRIDINE.—90/160, 19s. 6d. to 21s. per gall. Firmer. Heavy, 7s. to 10s. per gall.

Intermediates and Dyes

In the following list of Intermediates delivered prices include packages except where otherwise stated.

ACID AMIDONAPHTHOL DISULPHO (1-8-2-4).—10s. 9d. per lb.
 ACID ANTHRANILIC.—7s. per lb. 100%.
 ACID BENZOIC.—1s. 9d. per lb.
 ACID GAMMA.—9s. per lb.
 ACID H.—3s. 3d. per lb. 100% basis d/d.
 ACID NAPHTHIONIC.—2s. 2d. per lb. 100% basis d/d.
 ACID NEVILLE AND WINTHER.—4s. 9d. to 4s. 10d. per lb. 100% basis d/d.
 ACID SULPHANILIC.—9d. per lb. 100% basis d/d.
 ANILINE OIL.—7d. to 7½d. per lb. naked at works.
 ANILINE SALTS.—7d. to 8d. per lb. naked at works.
 BENZALDEHYDE.—2s. 1½d. per lb. Good home inquiry.
 BENZIDINE BASE.—3s. 3d. per lb. 100% basis d/d.
 o-CRESOL 29/31° C.—3d. to 3½d. per lb. Demand quiet.
 m-CRESOL 98/100%.—2s. 1d. to 2s. 3d. per lb. Demand moderate.
 p-CRESOL 32/34° C.—2s. 1d. to 2s. 3d. per lb. Demand moderate.
 DICHLORANILINE.—2s. 3d. per lb.
 DIMETHYLANILINE.—1s. 11d. to 2s. per lb. d/d. Drums extra.
 DINITROBENZENE.—9d. per lb. naked at works.
 DINITROCHLOROBENZENE.—£84 per ton d/d.
 DINITROPHENOL.—1s. 1d. per lb., 100% basis.
 DINITROTOLUENE.—48/50° C. 8d. per lb. naked at works. 66/68° C. 9d. per lb. naked at works.
 DIPHENYLANILINE.—2s. 10d. per lb. d/d.
 a-NAPHTHOL.—2s. per lb. d/d. Fair home inquiry.
 B-NAPHTHOL.—11d. to 1s. per lb. d/d. Fair home inquiry.
 a-NAPHTHYLAMINE.—1s. 3d. per lb. d/d. Fair home inquiry.
 B-NAPHTHYLAMINE.—3s. 9d. per lb. d/d. Fair home inquiry.
 o-NITRANILINE.—5s. 9d. per lb.
 m-NITRANILINE.—3s. 6d. per lb. d/d.
 p-NITRANILINE.—1s. 9d. to 1s. 10d. per lb. d/d. Fair home inquiry.
 NITROBENZENE.—5½d. per lb. naked at works. Good home inquiry.
 NITRONAPHTHALENE.—10d. per lb. d/d.
 R. SALT.—2s. 4d. per lb. 100% basis d/d.
 SODIUM NAPHTHIONATE.—1s. 9d. per lb. 100% basis d/d.
 o-TOLUIDINE.—9d. per lb. naked at works.
 p-TOLUIDINE.—2s. 2d. per lb. naked at works.
 m-XYLIDINE ACETATE.—2s. 11d. per lb. 100%.

Wood Distillation Products

ACETATE OF LIME.—Brown, £7 10s. Quiet market. Grey, £15 10s. per ton. Better inquiry. Liquor, 9d. per gall. 32° Tw.
 ACETONE.—£81 per ton.
 CHARCOAL.—£7 5s. to £9 per ton, according to grade and locality. Demand fair.
 IRON LIQUOR.—1s. 6d. per gall. 32° Tw. 1s. 2d. per gall., 24° Tw.
 RED LIQUOR.—10d. per gall. 16° Tw.
 WOOD CREOSOTE.—2s. 9d. per gall. Unrefined.
 WOOD NAPHTHA, MISCIBLE.—3s. 10d. per gall. 60% O.P. Solvent, 4s. 6d. per gall. 40% O.P. Very quiet.
 WOOD TAR.—£3 to £4 10s. per ton, according to grade.
 BROWN SUGAR OF LEAD.—£42 per ton.

Rubber Chemicals

ANTIMONY SULPHIDE.—Golden, 6d. to 1s. 5d. per lb., according to quality. Crimson, 1s. 3d. to 1s. 7½d. per lb., according to quality.
 ARSENIC SULPHIDE, YELLOW.—2s. per lb.
 BARYTES.—£3 10s. to £6 15s. per ton, according to quality.
 CADMIUM SULPHIDE.—2s. 9d. per lb.
 CARBON BISULPHIDE.—£20 to £25 per ton, according to quantity.
 CARBON BLACK.—5½d. per lb., ex wharf.
 CARBON TETRACHLORIDE.—£50 to £55 per ton, according to quantity, drums extra.
 CHROMIUM OXIDE, GREEN.—1s. 2d. per lb.
 DIPHENYLGUANIDINE.—3s. 9d. per lb.
 INDIARUBBER SUBSTITUTES, WHITE AND DARK.—5½d. to 6½d. per lb.
 LAMP BLACK.—£35 per ton, barrels free.
 LEAD HYPOSULPHITE.—9d. per lb.
 LITHOPONE, 30%.—£22 10s. per ton.
 MINERAL RUBBER "RUBPRON".—£13 12s. 6d. per ton f.o.r. London.
 SULPHUR.—£9 to £11 per ton, according to quality.
 SULPHUR CHLORIDE.—4d. per lb., carboys extra.
 SULPHUR PRECIP. B.P.—£47 10s. to £50 per ton.
 THIOCARBAMIDE.—2s. 6d. to 2s. 9d. per lb. carriage paid.
 THIOCARBANILIDE.—2s. 1d. to 2s. 3d. per lb.
 VERMILION, PALE OR DEEP.—5s. 3d. per lb.
 ZINC SULPHIDE.—1s. 1d. per lb.

Pharmaceutical and Photographic Chemicals

ACID, ACETIC, 80% B.P.—£42 per ton ex wharf London in glass containers.

ACID, ACETYL SALICYLIC.—2s. 5d. to 2s. 7d. per lb. Keen competition met. Good demand.

ACID, BENZOIC B.P.—2s. to 2s. 3d. per lb., according to quantity.

ACID, BORIC B.P.—Crystal, £43 per ton; Powder, £47 per ton. Carriage paid any station in Great Britain, in ton lots.

ACID, CAMPHORIC.—19s. to 21s. per lb.

ACID, CITRIC.—1s. 3½d. to 1s. 4d. per lb., less 5%. Unsettled.

ACID, GALLIC.—2s. 8d. per lb. for pure crystal, in cwt. lots.

ACID, PYROGALLIC, CRYSTALS.—5s. 3d. per lb. Resublimed, 7s.

ACID, SALICYLIC.—1s. 3d. to 1s. 6d. per lb. Technical.—10½d. to 11d. per lb.

ACID, TANNIC B.P.—2s. 10d. per lb.

ACID, TARTARIC.—1s. 0½d. per lb., less 5%. Market firm.

AMIDOL.—6s. 6d. per lb., d/d.

ACETANILIDE.—1s. 7d. to 1s. 8d. per lb. for quantities.

AMIDOPYRIN.—12s. 6d. per lb.

AMMONIUM BENZOATE.—3s. 3d. to 3s. 6d. per lb., according to quantity.

AMMONIUM CARBONATE B.P.—£37 per ton. Powder, £39 per ton in 5 cwt. casks.

ATROPINE SULPHATE.—11s. per oz. for English make.

BARBITONE.—10s. per lb.

BENZONAPHTHOL.—3s. 3d. per lb. spot.

BISMUTH CARBONATE.—15s. 6d. to 17s. 6d. per lb.

BISMUTH CITRATE.—12s. 9d. to 14s. 9d. per lb.

BISMUTH SALICYLATE.—12s. 6d. to 14s. 6d. per lb.

BISMUTH SUBNITRATE.—13s. to 15s. per lb. according to quantity.

BORAX B.P.—Crystal, £27; Powder, £28 per ton. Carriage paid any station in Great Britain, in ton lots.

BROMIDES.—Potassium, 1s. 9d. to 1s. 11d. per lb.; sodium, 2s. to 2s. 2d. per lb.; ammonium, 2s. 3d. to 2s. 5d. per lb., all spot.

CALCIUM LACTATE.—1s. 4d. to 1s. 5d. Market firmer.

CHLORAL HYDRATE.—3s. 3d. to 3s. 6d. per lb., duty paid.

CHLOROFORM.—2s. 3d. to 2s. 7½d. per lb., according to quantity.

CREOSOTE CARBONATE.—6s. per lb.

FORMALDEHYDE.—£40 per ton, in barrels ex wharf.

GUAIACOL CARBONATE.—7s. per lb.

HEXAMINE.—2s. 4d. to 2s. 6d. per lb.

HOMATROPINE HYDROBROMIDE.—30s. per oz.

HYDRASTINE HYDROCHLORIDE.—English make offered at 120s. per oz.

HYDROGEN PEROXIDE (12 VOLS.).—1s. 8d. per gallon f.o.r. makers' works, naked.

HYDROQUINONE.—4s. 4½d. per lb., in cwt. lots.

HYPOPHOSPHITES.—Calcium, 3s. 6d. per lb., for 28-lb. lots; potassium, 4s. 1d. per lb.; sodium, 4s. per lb.

IRON AMMONIUM CITRATE B.P.—2s. to 2s. 3d. per lb. Green, 2s. 4d. to 2s. 9d. per lb. U.S.P., 2s. 1d. to 2s. 4d. per lb.

MAGNESIUM CARBONATE.—Light Commercial, £31 per ton net.

MAGNESIUM OXIDE.—Light Commercial, £67 10s. per ton, less 2½%; price reduced; Heavy Commercial, £23 per ton, less 2½%; Heavy Pure, 2s. to 2s. 3d. per lb., according to quantity.

MENTHOL.—A.B.R. recrystallised B.P., 30s. net per lb., Synthetic, 17s. 6d. to 22s. 6d. per lb., according to quality. English make.

MERCURIALS.—Red oxide, 5s. 5d. to 5s. 7d. per lb.; Corrosive sublimate, 3s. 9d. to 3s. 11d. per lb.; white precipitate, 4s. 6d. to 4s. 8d. per lb.; Calomel, 4s. to 4s. 2d. per lb.

METHYL SALICYLATE.—1s. 7d. per lb.

METHYL SULPHONAL.—16s. 6d. per lb.

METOL.—9s. per lb. British make.

PARAFORMALDEHYDE.—1s. 11d. for 100% powder.

PARALDEHYDE.—1s. 4d. per lb.

PHENACETIN.—4s. to 4s. 3d. per lb.

PHENAZONE.—6s. to 6s. 3d. per lb. Spot lower than forward price.

PHENOLPHTHALEIN.—4s. to 4s. 3d. per lb. Supply exceeds demand.

POTASSIUM BITARTRATE 99/100% (Cream of Tartar).—80s. per cwt., less 2½% for ton lots. Market very firm.

POTASSIUM CITRATE.—1s. 11d. to 2s. 2d. per lb.

POTASSIUM FERRICYANIDE.—1s. 9d. per lb. in cwt. lots. Quiet.

POTASSIUM IODIDE.—16s. 8d. to 17s. 2d. per lb., according to quantity. Steady market.

POTASSIUM METABISULPHITE.—7½d. per lb., 1-cwt. kegs included, f.o.r. London.

POTASSIUM PERMANGANATE.—B.P. crystals, 7½d. per lb., spot, slightly easier.

QUININE SULPHATE.—2s. 3d. to 2s. 4d. per oz., in 100 oz. tins. Steady market.

RESORCIN.—3s. 9d. per lb. In fair quantities.

SACCHARIN.—51s. 5d. to 53s. 8d. per lb., according to quantity. Limited inquiry.

SALOL.—3s. per lb.

SODIUM BENZOATE, B.P.—1s. 10d. to 2s. 2d. per lb.

SODIUM CITRATE, B.P.C., 1911.—1s. 8d. to 1s. 11d. per lb., B.P.C., 1923. 1s. 11d. to 2s. 2d. per lb., according to quantity.

SODIUM FERROCYNANIDE.—4d. per lb. carriage paid.

SODIUM HYPOSULPHITE, PHOTOGRAPHIC.—£14 to £15 per ton, according to quantity, d/d consignee's station in 1-cwt. kegs.

SODIUM NITROPRUSSIDE.—16s. per lb.

SODIUM POTASSIUM TARTRATE (ROCHELLE SALT).—75s. to 80s. per cwt., according to quantity.

SODIUM SALICYLATE.—Powder, 1s. 10d. to 2s. per lb. Crystal, 1s. 11d. to 2s. 1d. per lb. Very heavy demand.

SODIUM SULPHIDE, PURE RECRYSTALLISED.—10d. to 1s. 2d. per lb.

SODIUM SULPHITE, ANHYDROUS, £27 10s. to £28 10s. per ton, according to quantity; 1-cwt. kegs included.

SULPHONAL.—11s. 6d. per lb. Limited demand.

TARTAR EMETIC, B.P.—Crystal or Powder, 1s. 8d. to 1s. 9d. per lb.

THYMOL.—12s. to 13s. 9d. per lb. Strong demand.

Perfumery Chemicals

ACETOPHENONE.—9s. per lb.

AUBEPINE (EX ANETHOL).—9s. 6d. per lb.

AMYL ACETATE.—3s. per lb.

AMYL BUTYRATE.—6s. 6d. per lb.

AMYL SALICYLATE.—3s. 3d. per lb.

ANETHOL (M.P. 21/22° C.).—5s. 6d. per lb.

BENZYL ACETATE FROM CHLORINE-FREE BENZYL ALCOHOL.—2s. 3d. per lb.

BENZYL ALCOHOL FREE FROM CHLORINE.—2s. 3d. per lb.

BENZALDEHYDE FREE FROM CHLORINE.—2s. 9d. per lb.

BENZYL BENZOATE.—2s. 9d. per lb.

CINNAMIC ALDEHYDE NATURAL.—18s. per lb.

COUMARIN.—11s. 9d. per lb.

CITRONELLOL.—15s. per lb.

CITRAL.—9s. per lb.

ETHYL CINNAMATE.—9s. per lb.

ETHYL PHTHALATE.—3s. per lb.

EUGENOL.—9s. 6d. per lb.

GERANIOL (PALMAROSA).—22s. 6d. per lb.

GERANIOL.—7s. to 16s. per lb.

HELIOTROPINE.—6s. per lb.

ISO EUGENOL.—14s. 6d. per lb.

LINALOL EX BOIS DE ROSE.—18s. per lb.

LINALYL ACETATE.—18s. per lb.

METHYL ANTHRANILATE.—9s. 3d. per lb.

METHYL BENZOATE.—5s. per lb.

MUSK KETONE.—30s. per lb.

MUSK XYLOL.—5s. 9d. per lb.

NEROLIN.—4s. per lb.

PHENYL ETHYL ACETATE.—12s. per lb.

PHENYL ETHYL ALCOHOL.—9s. 6d. per lb.

RHODINOL.—32s. 6d. per lb.

SAFROL.—1s. 4d. per lb.

TERPINEOL.—1s. 8d. per lb.

VANILLIN.—21s. 6d. to 24s. per lb. Good demand.

Essential Oils

ALMOND OIL.—12s. 6d. per lb.

ANISE OIL.—3s. 7d. per lb.

BERGAMOT OIL.—26s. per lb.

BOURBON GERANIUM OIL.—13s. per lb.

CAMPHOR OIL.—60s. per cwt.

CANANGA OIL, JAVA.—16s. per lb.

CINNAMON OIL, LEAF.—5d. per oz.

CASSIA OIL, 80/85%.—10s. 3d. per lb.

CITRONELLA OIL.—Java, 85/90%, 3s. 6d. Ceylon, 2s. 6d. per lb.

CLOVE OIL.—7s. 3d. per lb.

EUCALYPTUS OIL, 70/75%.—1s. 10d. per lb.

LAVENDER OIL.—French 38/40%, Esters, 22s. 6d. per lb.

LEMON OIL.—9s. 3d. per lb.

LEMONGRASS OIL.—4s. 9d. per lb.

ORANGE OIL, SWEET.—11s. 3d. per lb.

OTTO OF ROSE OIL.—Bulgarian, 60s. per oz. Anatolian, 35s. per oz.

PALMA ROSA OIL.—13s. per lb.

PEPPERMINT OIL.—Wayne County, 130s. per lb. Japanese, 15s. per lb.

PETITGRAIN OIL.—9s. 3d. per lb.

SANDAL WOOD OIL.—Mysore, 26s. per lb. Australian, 18s. 6d. per lb.

International Combustion Contract

INTERNATIONAL Combustion, Ltd., Africa House, Kingsway, London, has received the contract for the steam generating and transmission plant for a new super power station to be erected for the North Metropolitan Electric Supply Co. at Brimsdown, near Enfield. The Lopulco system of powdered fuel firing is to be installed. Five boilers with Lopulco water screens and Murray Usco fire furnaces will have a total heating surface of 11,000 sq. ft. each.

Mr. W. J. Cotterell sailed for South Africa on Friday, January 29, in connection with the contract recently awarded to International Combustion, Ltd., by the South African Electricity Commissioners for the Power Station at Congella, Durban. He will make an extended tour to deal with other important developments now pending in connection with "Lopulco" interests, and communications may be addressed to him, c/o Dowson and Dobson, Johannesburg.

London Chemical Market

The following notes on the London Chemical Market are specially supplied to THE CHEMICAL AGE by Messrs. R. W. Greeff & Co., Ltd., and Messrs. Chas. Page & Co., Ltd., and may be accepted as representing these firms' independent and impartial opinions.

London, February 5, 1926.

BUSINESS during the week has perhaps not been quite so active but is proceeding along quietly steady lines. A feature, however, is that competition tends to become keener and orders are again for smaller quantities. Prices on the whole continue remarkably steady. Export trade can only be described as moderately satisfactory, and much of the business offering is at unacceptable limits.

General Chemicals

ACETONE is very firm and in strong hands. Price quoted is £81 to £83 per ton, ex store.

ACID ACETIC has been in fair request, and there is no change in the quotation and a fair volume of export business has been in evidence.

ACID BORIC.—The English producers announce a reduction of £3 per ton, making the present quotation £37 per ton, with usual variations.

ACID FORMIC is unchanged, and available supplies move freely into consumption at £50 to £51 per ton.

ACID LACTIC is quietly steady at £43 to £44 per ton for 50% by weight.

ACID OXALIC continues firm and makers are expecting an advance. The present quotation is 3½d. to 3¾d. per lb., ex store.

ACID TARTARIC is uninteresting, and the material is quoted at 11½d. per lb.

ALUMINA SULPHATE continues active and is quoted at £5 15s. per ton for 17/18%.

AMMONIUM CHLORIDE continues weak, but there has been no further falling off in the last quoted price of £18 per ton. Demand is small.

ARSENIC.—Nothing to report. The article is as quiet as ever and price is nominally £13 10s. to £14 per ton, f.o.r. mines.

BARIUM CHLORIDE is firm and supplies continue extremely short. To-day's quotation is £10 to £10 5s. per ton.

BORAX has been reduced by £2 per ton, making the commercial quality £22 10s. per ton, with the usual extras.

BLEACHING POWDER is unchanged.

CREAM OF TARTAR is very scarce for prompt. Available supplies can be obtained at round about £76 to £77 per ton.

EPSOM SALTS are firm and in moderately active request at £5 15s. per ton.

FORMALDEHYDE continues quiet and a certain amount of competition is in evidence. To-day's quotation is £41 to £42 per ton.

LEAD ACETATE maintains its value and demand has slightly improved. It is quoted at £43 per ton for White and £42 for Brown.

LIME ACETATE is firm and scarce at £19 per ton.

LITHOPONE has been more active, and 30% red seal can be obtained at about £19 per ton, ex store.

METHYL ALCOHOL is unchanged at £48 per ton. Small business only.

METHYL ACETONE is very firm and scarce, and is quoted at £58 to £59 per ton.

POTASSIUM CARBONATE and CAUSTIC are unchanged.

POTASSIUM CHLORATE is firmer and is quoted at 4½d. per lb., with a good demand.

POTASSIUM PERMANGANATE is only in moderate request at 7½d. to 7¾d. per lb.

POTASSIUM PRUSSATE is not quite so firm owing to the small demand and supplies can be obtained at 7½d. to 7¾d. per lb.

SODIUM ACETATE is extremely scarce and available supplies are quoted at £20 per ton.

SODIUM BICHLORATE is unchanged at British makers' figures.

SODIUM CHLORATE is firm at 2½d. per lb., with a fair business.

SODIUM NITRITE.—Competition continues very keen and price is now about £21 10s. for fair quantities.

SODIUM PHOSPHATE is scarce and is quoted at £12 10s. to £13 per ton, with an upward tendency.

SODIUM PRUSSATE is firm at 4½d. to 4¾d. per lb.

SODIUM SULPHIDE.—The firm tendency is maintained, and to-day's quotation for Solid 60/62% is about £11 15s. per ton.

ZINC SULPHATE is firm and meets with a good inquiry at £13 per ton.

Coal Tar Products

The market generally maintains a firm tone.

MOTOR BENZOL shows an increased production during the last few weeks, with a tendency to decline in price. 90% benzol can be bought at 1s. 9d. per gallon on rails and motor benzol at about 1s. 8¾d. per gallon.

PURE BENZOL.—Production is generally small and 2s. 1d. to 2s. 2d. per gallon is readily obtainable on rails.

CREOSOTE OIL is quiet, and is quoted at 6d. to 6¼d. per gallon on rails in the North, while the price in London is 7½d. per gallon.

CRESYLIC ACID.—This market is very active for export quality, the pale quality, 97/99%, being quoted at 2s. to 2s. 1d. per gallon, while the dark quality, 95/97%, also for export, is quoted at 1s. 11d. to 2s. per gallon. For the home trade, supplies are readily obtainable, the pale quality being quoted at 1s. 7d. per gallon on rails and the dark quality at 1s. 6d. per gallon on rails.

SOLVENT NAPHTHA is very firm and supplies are short. The price is 1s. 5½d. per gallon to 1s. 6½d. per gallon, on rails.

HEAVY NAPHTHA is slightly more active, but is readily obtainable at 1s. 1d. to 1s. 2d. per gallon.

NAPHTHALENES are quieter, the lower grades being worth £4 to £4 10s. per ton, 76/78 quality about £6 per ton, and 74/76 quality about £5 10s. per ton.

PITCH is unchanged and there are no new features to report. To-day's approximate values are 57s. 6d. to 60s. per ton, f.o.b. U.K. ports.

Latest Oil Prices

LONDON.—LINSEED OIL steady and 2s. 6d. to 5s. higher. Spot, £32 10s.; February, £31 2s. 6d.; March-April, £31 7s. 6d.; May-August, £31 15s.; September-December, £31 17s. 6d. RAPE OIL quiet. Crude crushed, £47; technical refined, £50. COTTON OIL steady. Refined common edible, £42; Egyptian crude, £35; deodorised, £44. TURPENTINE quiet and 1s. 9d. to 2s. 3d. per cwt. lower. American, spot, 64s., taken, 64s. 3d., sellers; March-April, 64s. 9d.; and May-June, 64s. 6d.

Nitrogen Products Market

Export.—During the last week the demand has been more lively both from the Continent and the Far East, and sales have been made on the basis of £12 7s. 6d. per ton f.o.b. U.K. port, in single bags. British producers are still quoting this price for prompt shipment with slightly higher prices for March-April. The American sellers are practically off the export markets, but German producers have still fair quantities for sale between now and end April.

Home.—The home demand has set in, and is increasing in extent daily. It seems likely that the consumption of sulphate in the western counties will be almost double this year. Orders from all over the country are reaching the British producers in considerable volume. Home prices are not likely to be changed in any circumstances.

Nitrate of Soda.—The week shows small change in the nitrate position. The tendency for the accumulation of stocks has been retarded, but prices remain unchanged at £11 5s. per ton c.i.f. chief European ports.

Beet Sugar Developments

BET sugar developments still continue. The United Sugar Co. has closed its offices at Selby, Yorks, and the beet factory at Barlow is to be abandoned, owing, it is said, to lack of future supplies of beet.—The Anglo-Scottish Beet Sugar Corporation announce such satisfactory support for their Kidderminster factory that arrangements for supplies to keep it running at full capacity in 1926 are practically complete.—Mr. J. S. Wardlaw Milne, M.P., has stated that last year there were in Britain 55,000 acres under sugar beet cultivation; in 1928 there would be 165,000 acres. By the end of 1926, he said, twenty English factories would be operating. Farmers were anxious to grow the crops and the industry would undoubtedly benefit agriculture and also the taxpayer.—Reports from Magdeburg state that Mr. F. O. Light has made a further small reduction in his estimate of the European beet crop, his latest total being 7,422,000 tons against 7,482,000 previously. The estimate includes Czechoslovakia with 1,550,000 tons, Hungary 160,000 tons, France 755,000 tons, and Belgium 340,000 tons.

Acid-Resisting Plant Order

RECENT orders received by Meldrums, Ltd., for chemical plant in acid-resisting metal include nine 1½ in. and two 2 in. centrifugal motor-driven pumps for the Burma Oil Co. The Primitiva Gas Co., of Buenos Ayres, has ordered one 1½ in. centrifugal motor-driven pump and two anti-acid elevators for sulphuric acid. The elevators work automatically by compressed air, and only use power when acid is flowing. There is no dilution of acid, as is the case when steam lifters are used. The Vancouver Gas Co. has ordered a sulphate of ammonia ejector which does away with the old method of hand-fishing for the crystals and delivers them continuously on the drying table. Two gas washer scrubbers for sulphuric acid manufacture are to go to Canada.

Scottish Chemical Market

The following notes on the Scottish Chemical Market are specially supplied to THE CHEMICAL AGE by Messrs. Charles Tennant and Co., Ltd., Glasgow, and may be accepted as representing the firm's independent and impartial opinions.

Glasgow, February 5, 1926.

THERE has been no appreciable change in conditions in the heavy chemical market during the past week, inquiry both for home consumption and export being fairly satisfactory.

Prices generally are on about the same level as last reported but manufacturers advise a reduction in the prices of both borax and boracic acid of £2 and £3 per ton respectively.

Industrial Chemicals

ACID ACETIC, 98/100%.—Quoted £55 to £67 per ton according to quantity and packing, c.i.f. U.K. port. 80% pure, £40 to £41 per ton; 80% technical, £38 to £39 per ton packed in casks, c.i.f. U.K. ports.

ACID BORIC.—Crystal, granulated, or small flaked, £37 per ton; powdered, £39 per ton packed in bags, carriage paid to U.K. stations.

ACID CARBOLIC ICE CRYSTALS.—Demand remains good and quoted price advanced to about 5½d. per lb. delivered or f.o.b. U.K. ports.

ACID CITRIC, B.P. CRYSTALS.—Unchanged at about 1s. 3½d. per lb., less 5%, ex wharf, in moderate demand.

ACID FORMIC, 85%.—Continental offers remain steady at about £49 15s. per ton, ex wharf, prompt shipment. Spot material quoted £51 per ton, ex store.

ACID HYDROCHLORIC.—In little demand. Price 6s. 6d. per carboy, ex works.

ACID NITRIC, 80%.—Remains unchanged at £23 5s. per ton, ex station, full truck loads.

ACID OXALIC, 98/100%.—Continental price unchanged at about 3½d. per lb., ex wharf, prompt shipment. Spot material quoted 3½d. per lb., ex store.

ACID SULPHURIC.—144°, £3 12s. 6d. per ton; 168°, £7 per ton, ex works, full truck loads. Dearsenicated quality 20s. per ton more.

ACID TARTARIC, B.P. CRYSTALS.—Usual steady demand and price unchanged at about 11½d. per lb., less 5%, ex wharf.

ALUMINA SULPHATE, 17/18% IRON FREE.—On offer from the Continent at about £5 10s. per ton, c.i.f. U.K. ports. Spot material available at £6 5s. per ton, ex store.

ALUM, LUMP POTASH.—Quoted £7 15s. per ton, c.i.f. U.K. ports, prompt shipment. Spot material available at about £9 2s. 6d. per ton, ex store. Powdered quality on offer from the Continent at about £7 10s. per ton, c.i.f. U.K. ports.

AMMONIA ANHYDROUS.—Now quoted 1s. 3½d. per lb., ex station, containers extra and returnable.

AMMONIA CARBONATE.—Lump, £37 per ton; powdered, £39 per ton, packed in 5 cwt. casks, delivered U.K. ports.

AMMONIA LIQUID, 880°.—Unchanged at about 2½d. to 3d. per lb., delivered, according to quantity.

AMMONIA MURIATE.—Grey galvanisers' crystals of British manufacture quoted £26 to £27 per ton, ex station. On offer from the Continent at about £22 10s. per ton, c.i.f. U.K. ports. Fine white crystals quoted £18 15s. per ton, c.i.f. U.K. ports, prompt shipment from the Continent.

ARSENIC.—Refined white Cornish still in poor demand and price unchanged at about £16 10s. per ton, ex wharf, prompt shipment from works. Spot material now quoted about £17 per ton, ex store.

BARIUM CHLORIDE, 98/100%.—Large white crystals quoted £9 10s. per ton, ex store, spot delivery. On offer from the Continent at about £8 5s. per ton, c.i.f. U.K. ports. Fine white crystals about 5s. per ton less.

BLEACHING POWDER.—English material quoted £9 10s. per ton, ex station. Contracts 20s. per ton less. On offer from the Continent at about £7 15s. per ton, c.i.f. U.K. ports.

BARYTES.—English material unchanged at £5 5s. per ton, ex works. Continental quoted £5 per ton, c.i.f. U.K. ports.

BORAX.—Granulated, £22 10s. per ton; crystals, £23 per ton; powdered, £24 per ton, carriage paid U.K. stations.

CALCIUM CHLORIDE.—English manufacturers' price unchanged at £5 12s. 6d. to £5 17s. 6d. per ton, carriage paid U.K. stations. Continental available at about £3 17s. 6d. per ton, ex wharf.

COPPERAS, GREEN.—In moderate demand for export. Now quoted £3 17s. 6d. per ton, f.o.b. U.K. ports.

COPPER SULPHATE, 99/100%.—Good demand for export and price of English material unchanged at about £24 per ton, f.o.b. U.K. ports. Continental offer on at about £22 per ton, ex wharf.

FORMALDEHYDE, 40%.—Quoted £38 per ton, c.i.f. U.K. ports. Spot material available at about £39 5s. per ton, ex store.

GLAUBER SALTS.—English material unchanged at £4 per ton, ex store or station. Continental on offer at about £3 per ton, c.i.f. U.K. ports.

LEAD, RED.—Imported material now on offer at about £41 10s. per ton, ex store.

LEAD, WHITE.—Quoted £41 5s., ex store, spot delivery.

LEAD ACETATE.—Rather higher quotations from the Continent now quoted at about £43 per ton, c.i.f. U.K. ports. Spot material on offer at about £44 10s. per ton, ex store.

MAGNESITE, GROUND CALCINED.—In moderate demand and price unchanged at about £8 15s. per ton, ex station.

POTASH CAUSTIC, 88/92%.—Syndicate prices vary from £25 10s. to £28 15s. per ton, c.i.f. U.K. ports, according to quantity and destination. Spot material available at about £29 per ton, ex store.

POTASSIUM BICHROMATE.—Unchanged at 4½d. per lb., delivered.

POTASSIUM CARBONATE.—96/98 % quality quoted £25 10s. per ton, ex wharf, early delivery. Spot material available at about £26 10s. per ton, ex store. 90/92% quality quoted £22 10s. per ton, c.i.f. U.K. ports.

POTASSIUM CHLORATE 99/100%.—Prices quoted from the Continent now higher; powdered material about £30 per ton c.i.f. U.K. ports; crystals, £2 per ton extra.

POTASSIUM NITRATE, SALTPETRE.—Quoted £22 15s. per ton c.i.f. U.K. ports, prompt shipment. Spot material available at about £25 10s. per ton ex store.

POTASSIUM PERMANGANATE, B.P. CRYSTALS.—Spot material quoted 8d. per lb., ex store. Offered for early delivery at 7½d. per lb., ex wharf.

POTASSIUM PRUSSIAN, YELLOW.—On offer at about 7½d. per lb., ex store. Spot delivery offered for prompt shipment at about 7½d. per lb. c.i.f. U.K. ports.

SODA CAUSTIC.—76/77%, £17 10s. per ton; 70/72%, £16 2s. 6d. per ton; broken, 60%, £16 12s. 6d. per ton; powdered, 98/99%, £20 17s. 6d. per ton. All carriage paid U.K. stations, spot delivery. Contracts, 20s. per ton less.

SODIUM ACETATE.—Spot material scarce. Now quoted about £20 10s. per ton ex store.

SODIUM BICARBONATE.—Refined recrystallised quality, £10 10s. per ton, ex quay or station. M.W. quality 30s. per ton less.

SODIUM BICHROMATE.—English price unchanged at 3½d. per lb., delivered.

SODIUM CARBONATE.—Soda crystals, £5 to £5 5s. per ton, ex quay or station; powdered or pea quality, £1 7s. 6d. per ton more; alkali, 58%, £8 12s. 3d. per ton ex quay or station.

SODIUM HYPOSULPHITE.—Large crystals of English manufacture quoted £9 per ton, ex station. Minimum 4-ton lots. Pea crystals, £14 5s. per ton ex station. Continental commercial quality offered £9 per ton ex store.

SODIUM NITRATE.—Quoted £13 per ton ex store. 96/98%, refined quality, 7s. 6d. per ton extra.

SODIUM NITRITE, 100%.—Quoted £24 per ton ex store. Offered from the Continent about £22 5s. per ton c.i.f. U.K. ports.

SODIUM PRUSSIAN, YELLOW.—Spot material on offer at 4½d. per lb. ex store. Offered from the Continent for prompt shipment at about the same figure.

SODIUM SULPHATE, SALTCAKE.—Price for home consumption, £3 10s. per ton, ex works. Good inquiry for export and higher prices obtainable.

SODIUM SULPHIDE.—60/65% solid, £13 5s. per ton; broken, £14 5s. per ton; flake, £15 5s. per ton; crystals, 31/34%, £8 12s. 6d. per ton. All delivered buyers' works U.K., minimum 5-ton lots with slight reduction for contracts. 60/62%, solid quality, offered from the Continent at about £10 10s. per ton c.i.f. U.K. ports. Broken £1 per ton more; crystals 30/32%, £7 10s. per ton c.i.f. U.K. ports.

SULPHUR.—Flowers, £11 per ton; roll, £9 15s. per ton; rock, £9 15s. per ton; ground, £9 10s. per ton, ex store, spot delivery. Prices nominal.

ZINC CHLORIDE.—British material, 95/98%, quoted about £24 per ton f.o.b. U.K. ports. 98/100, solid, on offer from the Continent at about £22 10s. per ton c.i.f. U.K. ports; powdered, about 20s. per ton extra.

ZINC SULPHATE.—Continental manufacture on offer at about £11 per ton, ex wharf.

NOTE.—The above prices are for bulk business, and are not to be taken as applicable to small parcels.

Coal Tar Intermediates and Wood Distillation Products

SULPHANILIC ACID.—9d. per lb. Some home inquiries.

ALPHA NAPHTHOL.—2s. per lb. Small home inquiries.

H. ACID.—3s. 3d. per lb. Some home inquiries.

BETA NAPHTHOL.—11d. to 1s. per lb. Good home inquiries.

NAPHTHONATE OF SODA.—1s. 9d. per lb. Small home inquiries.

Manchester Chemical Market

(FROM A CORRESPONDENT.)

Manchester, February 5, 1926.

THE general level of values on the Manchester chemical market keeps up remarkably well having regard to the comparatively quiet state of the demand. In only a few instances is there any sign of weakness and in no case is it very pronounced. Buyers are coming on the market largely for spot or early deliveries and traders are not anticipating any marked revival of forward business until a definite and fairly general improvement in the condition of trade comes about.

Heavy Chemicals

Hyposulphite of soda is easy at £13 10s. to £14 per ton for photographic crystals and about £10 for commercial material; buying is on a small scale and little improvement has occurred. Phosphate of soda keeps rather inactive and some weakness is apparent here also, about £12 5s. per ton being quoted. Caustic soda meets with a quietly steady demand at firm rates; £15 2s. 6d. per ton is asked for 60 per cent. quality and £17 10s. for 76-77 per cent. Bleaching powder is held at round £8 10s. per ton and the demand for this article is fair. Alkali is steady and in moderate request at about £6 15s. per ton. Acetate of soda keeps very firm and £19 to £19 10s. per ton is now being quoted for this material. The demand for sulphide of sodium is slow and values lack strength; 60-65 per cent. concentrated solid is now no better than about £11 10s. per ton, with commercial quality quoted at round £9 10s. Prussiate of soda is fully maintained at about 4½d. per lb. and a fair volume of business is passing. The demand for chlorate of soda is rather quiet but prices are unaltered at 3½d. to 3¼d. per lb. Bichromate of soda is steady though in limited request at about 3½d. per lb. Saltcake is still quoted at £3 per ton but without arousing any increase of buying interest. Glauber salts are offering at £3 5s. per ton, with business slow. Quotations for bicarbonate of soda are maintained at £10 10s., and a quiet demand is reported. For soda crystals offers are still on the basis of £5 5s. per ton.

Yellow prussiate of potash continues steady and in moderate inquiry at 7½d. per lb. Not much demand is being experienced for permanganate of potash and rates are easy at 7½d. to 7¼d. per lb. for pharmaceutical quality and 5½d. for commercial. Carbonate of potash continues to attract a fair amount of buying interest and prices are pretty well maintained, 96-98 per cent. strength being quoted at round £26 per ton. The demand for caustic potash is rather slow and at £27 10s. per ton for the 90 per cent. strength prices are easy. Chlorate of potash is unchanged either in position or value, 4d. per lb. being quoted. Bichromate of potash keeps at 4½d. to 4¼d. per lb.

Arsenic continues in quiet demand at easy rates, with white powdered, Cornish makes, quoted at about £14 per ton, on rails. Sulphate of copper is rather inactive, with prices fairly strong at £24 to £24 10s. per ton. The quotations for acetate of lime continue firm, with round £18 per ton asked for grey material and £8 for brown. The lead compounds are also well held. Nitrate is quiet at £40 to £41 per ton. White acetate of lead is quoted at round £44 and brown at £39 to £40 per ton. Epsom salts are fairly steady though demand is quiet at £3 10s. per ton, with magnesium sulphate, pharmaceutical quality, quoted at about £4 10s.

Acids and Tar Products

The demand for acetic acid is not particularly brisk though quotations are steady; 80 per cent. commercial brings round £37 per ton and glacial acetic £67 to £68. Tartaric acid is slow at 11¼d. to 11½d. per lb. Citric acid is also in limited request at about 1s. 3½d. per lb. Oxalic acid is quiet but fairly steady at 3½d. per lb.

In coal tar products values are fairly steady all round, with business on moderate lines. Creosote oil is unchanged at 6½d. per gallon. Pitch is firm at 57s. 6d. per ton, with demand on a fair scale. Carbolic acid is steady at 5d. to 5½d. per lb. for crystals and 1s. 4½d. per gallon for crude material. Solvent naphtha is about unchanged at 1s. 5½d. per gallon. Crude naphthalene is in fair request at £4 10s. per ton and upwards.

Tariff Changes

BRITISH INDIA.—The Customs Tariff has been completely revised as from January 1. We give below the main items in the Chemical and Dyestuffs sections of the Import Tariff. The whole of the new Tariff is printed in the *Board of Trade Journal* for January 28.

Serial No.	No. in the Statutory Schedule.	Names of Articles.	Per	Tariff Valuation. R. A.	Duty. Free per cent.
65A	14A	Sulphur	—	—	—
66	88	Chemicals, Drugs, etc.—	—	—	—
		Alkali, Indian (sajji-khar) ...	cwt.	3 8	15
		Alum (lump)	"	6 0	15
		Muriate of Ammonia, crystal-line	"	20 0	15
		Salammoniac, sublimed	"	23 0	15
		Other sorts of muriate of ammonia, including compressed	"	25 0	15
		Arsenic (China mansil)	"	85 0	15
		" other sorts	—	ad val.	15
		Bleaching powder	cwt.	11 0	15
		Calcium chloride	"	5 0	15
		Carbide of calcium	"	18 0	15
		Carbonate of ammonia	"	34 0	15
		Epsom salts (in bulk)	"	4 0	15
		Magnesium chloride	"	4 0	15
		Potassium Bichromate	"	30 0	15
		Silicate of soda (liquid)	"	8 8	15
		Soda ash	"	6 0	15
		Soda, bicarbonate	"	8 8	15
		Soda, bichromate	"	25 8	15
		Soda, caustic, solid	"	10 8	15
		" " flake	"	15 0	15
		" " powdered	"	15 8	15
		Soda crystals (in bulk)	"	5 8	15
		Sodium Sulphide	"	8 0	15
		Sulphate of copper	"	17 0	15
		Trona or natural soda	"	3 8	15
		All other sorts of chemical products and preparations not otherwise specified	—	ad val.	15
81	92	Alizarine dye, dry, not exceeding 40 per cent.	lb.	1 8	15
		Alizarine dye, dry, over 40 per cent. but under 50	"	1 12	15
		Alizarine dye, dry, over 50 per cent. but under 60	"	2 0	15
		Alizarine dye, dry, over 60 per cent. but under 70	"	2 4	15
		Alizarine dye, dry, over 70 per cent. but under 80 ..	"	2 8	15
		Alizarine dye, dry, over 80 per cent.	"	3 0	15
		Alizarine dye, moist, not over 10 per cent.	"	0 6	15
		Alizarine dye, moist, over 10 per cent. and not over 16 per cent.	"	0 7	15
		Alizarine dye, moist, over 16 per cent. and not over 20 per cent.	"	0 9	15
		Alizarine dye, moist, over 20 per cent.	"	0 14	15
		Aniline dye, moist	"	1 12	15
		" dyes, black (sulphur) ..	"	0 10	15
		Aniline dyes, congo red	"	1 0	15
		All other aniline dyes, dry ...	"	2 2	15
		Aniline salts	—	ad val.	15
		Lead, red, dry	cwt.	32 0	15
		" white, dry	"	32 0	15
		Lithopone	"	16 0	15
		Turpentine	Imp. gal.	5 0	15
		Vermilion, Canton	160 0 bndls.	160 0	15
		Zinc, white, dry	cwt.	35 0	15

BELGIUM.—A sales tax of 2 per cent. has been fixed on imported chemical fertilisers, oil cakes, and animal manures.

TURKEY.—The following may now be imported free of Customs duty:—Pure chlorate of potash, chlorate of soda, nitrate of potash, nitrate of soda, and nitroglycerine (1 per cent. of alcohol).

JAPAN.—The following are proposed new Import duties. The present duties are given in parentheses:—Yens per 100 kin: Glycerine, 18'00 (3'20); paints, copper, antifouling, etc., 5'80 (6'15); enamel, 17'20 (13'20); artificial silk, 125'00 (87'90).

Alleged Infringement of Chemical Patent

Further Evidence for the Defence

THE case for the defence in the action by the Commercial Solvents Corporation, Ltd., against the Synthetic Products Co., Ltd., was continued before Mr. Justice Romer in the Chancery Division on Thursday, January 28, by Mr. Whitehead, K.C. (see THE CHEMICAL AGE, January 16, 23 and 30). The plaintiffs are claiming an injunction restraining the defendants from infringing their patented process for the production of acetone and butyl alcohol from the starch of maize or other grains by means of a bacillus known as "βγ" which Dr. Weizmann claims to have isolated.

Mr. Whitehead, continuing for the defence, submitted that no inventive step had been disclosed by the documents relating to Dr. Weizmann's process, and that the description of the process in the specification did not enable it to be worked as claimed. As to prior user, the bacillus known as "X 160" did everything that the plaintiffs asserted "βγ" could do, and that the defendants had carried on fermentation processes both at Rainham and King's Lynn before and up to the date of the plaintiffs' patent which produced large yields of acetone and butyl alcohol. While the present action covered new ground in a bacteriological sense, the old conditions applied and the methods used were the ordinary methods which would inevitably produce the desired results. It was merely a question of which bacterium would do the work best, and for that no inventive step was necessary.

On the question raised by the petition for revocation, he said that Dr. Weizmann might have been quite honest in the way his patent was drawn and yet unintentionally have covered "F.B.," while thinking that "βγ" was a bacillus of a different species. Although he would be acquitted of any evil intent, yet his patent would be bad. The grounds alleged for "obtaining" were that Dr. Weizmann had obtained "F.B.," that he was shown that "F.B.," though an anaerobic bacillus, would grow and work under conditions not strictly anaerobic, that heat treatment for the vivifying of butyllic ferments was communicated to him after experiments in Paris, and that he was told that these butyllic ferments would act without stimulant.

King's Lynn Manager's Evidence

Mr. Thomas Kane, manager at the defendants' King's Lynn works, gave evidence that he first put fermentation processes into operation at Rainham in 1911, with the object of designing plant for the production of butyl alcohol in connection with the manufacture of synthetic rubber. The cultures he used were received from Professor Fernbach at the Pasteur Institute, and he worked at first on maize alone. Later, however, he used potatoes and other roots. He described the processes that were adopted and declared that he obtained satisfactory results with "F.B." He was cross-examined at great length on the question of prior user. He explained that the results he obtained were more satisfactory than those obtained by the plaintiffs; no doubt due to the fact that the plaintiffs used a different strain of the same bacillus.

On the resumption of the hearing on Wednesday, Mr. Strange's cross-examination was pursued. He said that Dr. Weizmann took part in the conference that resulted in defendants' 1912 patent being taken out, but he did not think he saw the draft of the specification. In a report about that time signed by himself and Dr. Matthews it was stated that frequent tests had been made of Professor Fernbach's fermentation process for the production of the higher alcohols and acetone, maize and potatoes being the raw material used. He said that in his opinion the specification of Dr. Weizmann's process was identical with Professor Fernbach's in the parts that could be worked, but the 1912 specification did not include the heat treatment which Professor Fernbach had shown to Dr. Weizmann. But he thought the claim for aerobic conditions was wrong. When the Synthetic Products Co. resumed operations at King's Lynn in 1923 maize was the raw material used, and ground maize was now used invariably.

In cross-examination he said the Government was informed in 1915 that they had a successful fermentation process with maize and asked for an opportunity to demonstrate it. In fact at Rainham in 1912 they produced acetone in cwt. lots by the fermentation of maize, but not very often, owing to difficulties connected with plant. Asked if he would have floated a company on the faith of the Rainham experiments,

he said he would if he could have got the public to subscribe; but being himself an unknown chemist, while Professor Fernbach had an international reputation, he was compelled to bow to the force of circumstances and use potatoes as the raw material. He told Professor Fernbach before June, 1912, of his success with maize. In fact, he reported to him regularly the results of his Rainham experiments.

Mr. Morris Schoen, assistant to Professor Fernbach, was next called. He spoke as to different species of bacilli and of his experiments with various cultures. The hearing was adjourned.

Company News

MOND NICKEL CO.—An interim dividend of 5 per cent. in respect of the year ending April 30 has been declared, payable on March 1.

BORAX CONSOLIDATED.—The directors announce a final dividend of 1s. 6d. per share, less tax, on the deferred ordinary shares, making 12½ per cent. for the past year.

JURGENS, LTD.—A dividend for the half year ended December 31 is announced on the cumulative participating preference shares at the rate of 7 per cent. per annum.

ENGLISH VELVET AND CORD DYERS' ASSOCIATION.—A final dividend of 5 per cent. is recommended on the ordinary stock, making 7 per cent. for the past year, and a balance of £25,087 is carried forward.

JOHN KNIGHT, LTD.—For the year ended November 30 last, the directors report shows a net profit of £156,507, and £67,648 was brought forward. A dividend of 30 per cent. is proposed on the ordinary shares, carrying forward £78,155. The annual meeting will be held at the Great Eastern Hotel, Liverpool Street, London, on February 19, at 12 noon.

GAS LIGHT AND COKE CO.—In their report for the year ended December 31 last, the directors state that a net revenue of £1,262,059 was secured, comparing with £1,376,739 for the previous year. A balance of £223,583 was brought in, and, after payment of the half-year dividends to June and placing £20,000 to the redemption fund, an available balance of £649,123 remains. A final dividend is now recommended on the ordinary stock at the rate of £4 17s. 4d. per cent. per annum, making a total distribution for the year of £5 2s. per cent., and after placing £15,000 to the redemption fund a balance of £107,988 is carried forward.

Chemical Trade Inquiries

Municipal, etc., authorities are inviting tenders as follows. (Dates in parentheses represent last days for tenders to be received.)

BOOTLE, LANCS.—Cement, pitch, oils, creosote oil and tar, soaps. Forms from Borough Engineer (February 13).

CARDIFF.—King's Roll firms only. Portland cement, paints, varnishes, oils, soaps. Forms from City Engineer (February 10).

LIVERPOOL.—Cement, oils and paints, soap, carbolic acid and powder. Forms from City Engineer (February 17).

SALFORD.—Aluminium sulphate, 400 tons containing 14 to 15 per cent. aluminium oxide. Samples required. Tenders to Chairman, River Committee, Town Hall (February 10).

Important Increase in Oil Importation Facilities

THE L.N.E.R. Co. announce that owing to the increasing importation and demand for oil into Great Britain they have decided to construct a second oil jetty at Salt End, three miles east of Hull in the Humber estuary. The decision will make the Humber one of the largest oil storage depots on the East Coast. The existing oil jetty has been effecting the discharge of oil in bulk from oil tanker ships at the rate of 340,000 tons per annum. Oil in bulk can be discharged through the pipes to the storage tanks with expedition, and an oil tank steamer carrying 15,000 tons can be discharged in 48 hours. The new jetty will be on similar lines, and will probably double the quantity of oil now discharged there. The oil companies which have installations of oil tanks at Salt End include British, Dutch, and American firms.

Fire Protection a science



How FOAMITE Equipment smothers any Blaze without damaging property.

Expelled in a swift stream from Foamite equipment, thousands of tough, clinging gas bubbles quickly blanket any burning object and cut off the oxygen of the air so that combustion is impossible.

The potent Firefoam is equally effective on floor, walls or ceiling, and it floats on any liquid. Draughts cannot dislodge it. It resists great heat. The foam stream is non-conductive.

Fiercely blazing petrol, paint, tar—which defy other extinguishing methods—are easily smothered under Firefoam. Ordinary fires die instantly. The foam not only puts out the fire but prevents re-ignition.

Nothing in fire protection history compares with the quick, sure smothering action of the Firefoam produced by Foamite apparatus.

Instantly effective on all fires, this remarkable method gives industry a positive security that was formerly unavailable.

FOR many years fire appliances capable of dealing with fires of an ordinary nature, such as might occur in offices, have been in general use, but the widespread introduction of petrol and fuel oil saw the advent of a fire risk demanding a new extinguishing medium which would *in addition* be adequate for dealing with fires involving inflammable liquids. After lengthy research, the last decade saw the introduction of the FOAMITE method of Fire Protection with portable equipment and fixed installations producing a fire extinguishing medium (Firefoam) which met this demand.

Proved supreme for all industry by its complete success in the oil industry.

Because it has never failed against the tremendous fire hazards of the oil industry—for which it was first developed—Foamite Protection offers super-protection for less hazardous industrial risks.

Over 2,000,000 tons of British shipping and over 25,000 oil tanks have Foamite Protection which is endorsed by all authorities.

Your plant can have the same sure safeguard. The engineers who have perfected Foamite Protection can prescribe an installation that covers your fire risk at every point. Behind these specialists is the company with years of experience in scientific fire protection engineering, prepared to give you the advantage of that experience, without obligation.

Send for a copy of our new illustrated booklet "Extinguishing Oil and Other Fires." It is a concise guide to real security from uncontrolled fire. Free, upon request.

Foamite Fire Protection

Foamite Firefoam Ltd.,
24/26, Maddox St.,
LONDON, W.1

Commercial Intelligence

The following are taken from printed reports, but we cannot be responsible for any errors that may occur.

County Court Judgments

[NOTE.—The publication of extracts from the "Registry of County Court Judgments" does not imply inability to pay on the part of the persons named. Many of the judgments may have been settled between the parties or paid. Registered judgments are not necessarily for debts. They may be for damages or otherwise, and the result of bona-fide contested actions. But the Registry makes no distinction of the cases. Judgments are not returned to the Registry if satisfied in the Court books within twenty-one days. When a debtor has made arrangements with his creditors we do not report subsequent County Court judgments against him.]

ST. JOHN FARROW (trading as F. ST. JOHN), 6, Great Sutton Street, E.C., druggists' sundriesman. (C.C., 6/2/26.) £29 ros. 10d. December 16.

WEST LANCASHIRE REFINING CO., Carruthers Street, Vauxhall Road, Liverpool, oil refiners. (C.C., 6/2/26.) £15 7s. 3d. January 2.

Bill of Sale

WILLIAMS, William Trefor, 20, Queen Ann Green, Bush Hill Park, chemical engineer. (B.S., 6/2/26.) Filed January 29. £80.

Mortgages and Charges

[NOTE.—The Companies Consolidation Act of 1908 provides that every Mortgage or Charge, as described therein, shall be registered within 21 days after its creation, otherwise it shall be void against the liquidator and any creditor. The Act also provides that every Company shall, in making its Annual Summary, specify the total amount of debts due from the Company in respect of all Mortgages or Charges. The following Mortgages and Charges have been so registered. In each case the total debt, as specified in the last available Annual Summary, is also given—marked with an *—followed by the date of the Summary, but such total may have been reduced.]

COOKE (WALTER) (LEICESTER), LTD., bleachers, etc. (M., 6/2/26.) Registered January 21, £1,500 debentures, present issue £1,300; general charge (including benefit of lease of premises in Rugby Street, Leicester, etc.).

Satisfactions

CLINICAL RESEARCH ASSOCIATION, LTD., London, S.E. (M.S., 6/2/26.) Satisfaction registered January 26, £15,000, registered December 2, 1909.

KIRKALDY (J.) AND SON, LTD., London, E., paint manufacturers. (M.S., 6/2/26.) Satisfaction registered January 23, £8,000, balance of amount registered July 31, 1906.

SUTTON (W.) AND CO. DRUGGISTS SUNDRIES LONDON, LTD. (M.S., 6/2/26.) Satisfaction registered January 26, £500, part of amount registered January 1, 1924.

London Gazette, &c.

Company Winding Up

VAUXHALL CHEMICAL CO., LTD., Meetings of creditors, February 11, 11.30 a.m., and contributories, February 11, 12 noon; 33, Carey Street, Lincoln's Inn, London, W.C.2.

Company Winding Up Voluntarily

TOILET SUPPLIES, LTD. (C.W.U.V., 6/2/26.) L. G. F. Waddington, Incorporated Accountant, 2, St. Sepulchre Gate, Doncaster, appointed liquidator, January 22.

Application for Discharge

ARMFIELD, Nathaniel, 124, Usk Road, Battersea, London, manufacturing chemist. (A.F.D., 6/2/26.) Hearing, March 1, 10.30 a.m., The Court House, Wandsworth.

Partnerships Dissolved

GREAT NORTHERN VINEGAR CO. (Walter Thomas REEVE and George MARTIN), vinegar manufacturers, Gill Street, Limehouse, by mutual consent as from December 7, 1925. Debts received and paid by G. Martin.

MACALISTER, SONS AND CO. (George MACALISTER, Thomas Paton MACALISTER and Agnes MACALISTER), chemical manufacturers and drysalts, Glasgow, as at December 31, 1925, by the retiral of George MacAlister. The

business will be carried on by T. P. and A. MacAlister under the same firm name. G. MacAlister will carry on business under his own name at 66, Abbotsford Place, Glasgow.

Business Names Registered

The following (trading name and address, nature of business, date of commencement, and proprietors' names and addresses) have been registered under the Registration of Business Names Act.

BAYNARDS FULLERS EARTH CO., Lodge House Estate, Baynards, Horsham, manufacturers refined fuller's earth, January 12, 1926. Bertha Keeley, Lodge House, Baynards, Horsham.

New Companies Registered

GABAIL, LTD., 70 and 72, Chancery Lane, London, W.C.2. Registered January 29, 1926. Manufacturers of and dealers in drugs, medicines, dyestuffs, colours, bleaches, oils, etc. Nominal capital, £500 in £1 shares.

RATIONAL CARBONIZATION SYNDICATE, LTD., 126, Bishopsgate, London, E.C.2. Registered January 26, 1926. To construct a plant for demonstrating the utility of certain inventions (1) for improvements in the treatment of coal, etc.; (2) for the economical manufacture of water gas, and (3) for the manufacture of metallurgical coke. Nominal capital, £6,000 in 2s. shares.

Pioneer Chemists in the Rubber Industry

S.C.I. Joint Meeting at Birmingham

THE Birmingham and Midland Section of the Society of Chemical Industry held a joint meeting with the Institution of the Rubber Industry at Birmingham University on Tuesday, January 19. Mr. Colin MacBeth presided in the absence of Dr. D. F. Twiss (chairman of the Birmingham Section, who is abroad), and a paper on the "Early Days of the Rubber Industry" was delivered by Mr. B. D. Porritt (director of the Research Association of British Rubber Manufacturers). He pointed out that the evolution of the industry was due in no small measure to the chemist. Priestley first drew attention to the use of "Caoutchouc." Later, gas manufacturers found that tar and other by-products accumulated, and Charles Macintosh, chiefly with a view to the production of ammonia to be employed in the manufacture of Cudbear, entered in 1819 into a contract with the proprietors of the Glasgow Gasworks, to receive for a term of years the tar and ammoniacal liquor produced at the works. After the separation of the ammonia in the conversion of the tar into pitch, to suit the purposes of consumers, the essential oil, naphtha, is produced. By exposure to naphtha, he converted Caoutchouc into a waterproof varnish, the thickness and consistency of which he varied according to the quantity of naphtha employed. Mr. Porritt pointed out that it was the discovery by Murdoch of coal gas, earlier still in the nineteenth century, which led to the production of tar and to the separation of naphtha, and eventually to the use of coal tar naphtha as a solvent for rubber.

Discovery of Vulcanisation

In 1846, Alexander Parkes, a Birmingham chemist, who was the original inventor of xylonite, found out the process of vulcanisation by dipping rubber goods in sulphur chloride dissolved in a carbon disulphide, commonly known as the "Cold Cure Process," and it was this discovery of vulcanisation that materially extended the application of rubber. Goodyear and Hancock, by other discoveries, also played an important part in the evolution of the industry.

The CHAIRMAN said the great part played by the English rubber chemist was not sufficiently recognised. His scientific knowledge was invaluable, though the early pioneers seemed to have worked chiefly by rule of thumb.

For Marking Chemical Porcelain

THE Coors Porcelain of Golden, Colo., furnishes the following formula for a marking ink for chemical porcelain: 18.8 grams of commercial black oxide of cobalt, 1.2 grams of bismuth subnitrate, 15 c.c. of oil of turpentine, and 15 drops of Dresden thick oil. The ingredients are thoroughly mixed by grinding.

